DEPARTMENT OF THE NAVY
NAVAL FACILITIES ENGINEERING COMMAND SOUTHWEST
INTEGRATED PRODUCT TEAM WEST
2001 JUNIPERO SERRA BOULEVARD, SUITE 600
DALY CITY, CALIFORNIA 94014-1976

IN REPLY REFER TO:

Ser 05/217
November 24, 2004

Mr. Phillip A. Ramsey
U.S. Environmental Protection Agency
Region IX
75 Hawthorne Street
San Francisco, CA 94105

Re: DRAFT ENGINEERING EVALUATION/COST ANALYSIS, NON-TIME CRITICAL REMOVAL ACTION FOR TAYLOR BOULEVARD BRIDGE (SITE 30), NAVAL WEAPONS STATION SEAL BEACH, DETACHMENT CONCORD, CONCORD, CALIFORNIA

Dear Mr. Ramsey,

In accordance with Sections 10.2 (b) and 10.7 (b) of the Federal Facility Agreement (FFA), enclosed please find for your review the "Draft Engineering Evaluation/Cost Analysis Non-Time Critical Removal Action for Taylor Boulevard Bridge (Site 30), Naval Weapons Station Seal Beach, Detachment Concord" (draft EE/CA). This draft EE/CA is a secondary document and in accordance with Section 10.7 (b) of the FFA, your review is to be completed within sixty (60) calendar days following receipt of the document. Therefore, Agency review comments are requested by Tuesday, January 25, 2005.

2. If there are any questions regarding the enclosed plan, please contact me at telephone No. 650-746-7451 or Internet e-mail: stephen.f.tyahla@navy.mil.

Sincerely,

Stephen F. Tyahla, P.E., CHMM
Lead Remedial Project Manager

Enclosure
Copy to:
U.S. Environmental Protection Agency, Region 9 (Attn: Sonce de Vries)
National Oceanic and Atmospheric Administration (Attn: Denise Klimas)
National Oceanic and Atmospheric Administration (Attn: Laurie Sullivan)
California Department of Toxic Substances Control Region 1 (Attn: Jim Pinasco)
California Regional Water Quality Control Board, SFBAY (Attn: Laurent Meillier)
California Department of Fish and Game (Attn: Frank Gray)
California Department of Fish and Game (Attn: Bruce Joab)

Re: DRAFT ENGINEERING EVALUATION/COST ANALYSIS, NON-TIME CRITICAL REMOVAL ACTION FOR TAYLOR BOULEVARD BRIDGE (SITE 30), NAVAL WEAPONS STATION SEAL BEACH, DETACHMENT CONCORD, CONCORD, CALIFORNIA

Copy to (continued):
Contra Costa County Environmental Health, LEA (Attn: Agnes T. Vinluan)
Cal/EPA Integrated Waste Management Board Permitting &
Enforcement Division (Attn: Frank Davies)
Restoration Advisory Board (RAB) Co-Chair (Attn: Ms. Mary Lou Williams)
RAB Member Chris Boyer
RAB Member Kevin Cornish
RAB Member David Griffith
RAB Member Gregory Glaser
RAB Member Ed McGee
RAB Member Mario Menesini
RAB Member Julie Nelson
RAB Member Ray O'Brien
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Clearwater Consultants (Attn: Patrick Lynch)
Tech Law, Inc. (Attn: Jennifer Hollingsworth)
NWS Seal Beach, N45WS (Attn: Margaret Wallerstein)
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Weston Solutions (Attn: Claudette Altamirano)
TtEMI San Francisco (Attn: Joanna Canepa)
TtEMI San Francisco (Attn: Cindi Rose)

A-E CERCLA/RCRA/UST STUDIES AND REMEDIAL DESIGN

Contract Number N68711-03-D-5104

Engineering Evaluation/Cost Analysis Non-Time Critical Removal Action for Taylor Boulevard Bridge Disposal Site (Site 30)

Naval Weapons Station Seal Beach
Detachment Concord
Concord, California

DS.B041.14437

DRAFT

November 24, 2004

Department of the Navy
Naval Facilities Engineering Command
Southwest Division
San Diego, California

A Joint Venture of Sullivan Consulting Group and Tetra Tech EM Inc.

A-E CERCLA/RCRA/UST Contract Number N68711-03-D-5104
Contract Task Order 0041

Draft
Engineering Evaluation/Cost Analysis
Non-Time Critical Removal Action for

Taylor Boulevard Bridge Disposal Site (Site 30)

Naval Weapons Station Seal Beach Detachment Concord, Concord, California

November 24, 2004

Prepared for

DEPARTMENT OF THE NAVY
Naval Facilities Engineering Command
Southwest Division
San Diego, California

Prepared by

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Cindi Rose, Project Manager

DS.B041.14437

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Appendix

FIGURES

TABLES

ACRONYMS AND ABBREVIATIONS

µg/dL	Micrograms per deciliter
µg/kg	Micrograms per kilogram
µg/L	Micrograms per liter
§	Section
AOC	Area of concern
ARAR	Applicable or relevant and appropriate requirement
BAAQMD	Bay Area Air Quality Management District
BAF	Bioaccumulation factor
bgs	Below ground surface
BERA	Baseline ecological risk assessment
BNSF	Burlington Northern Santa Fe Railroad Company
CA/HSC	California Health and Safety Code
Cal/EPA	California Environmental Protection Agency
CDFG	California Department of Fish and Game
CERCLA	Comprehensive Environmental Response Compensation and Liability Act
CCR	*California Code of Regulations*
CFR	*Code of Federal Regulations*
COC	Chemicals of concern
COEC	Chemicals of ecological concern
COPC	Chemicals of potential concern
CSM	Conceptual site model
DTSC	California Department of Toxic Substances Control
EE/CA	Engineering evaluation and cost analysis
EPA	U.S. Environmental Protection Agency
ERA	Ecological risk assessment
ER-M	Effects range-median
EO	Executive order
HHRA	Human health risk assessment
HI	Hazard index
HQ	Hazard quotient
LDR	Land disposal restriction
LGP	Low ground pressure
LUC	Land use controls
msl	Mean sea level
mg/kg	Milligrams per kilogram
mg/L	Milligrams per liter

NAWQC	National Ambient Water Quality Criteria
NCP	National Oil and Hazardous Substances Pollution Contingency Plan
NTCRA	Non-time Critical Removal Action
NWS SBD	Naval Weapons Station Seal Beach Detachment
O&M	Operations and maintenance
ORNL	Oak Ridge National Laboratory
PAH	Polynuclear aromatic hydrocarbon
PAS	Pacific Aerial Surveys
PCB	Polychlorinated biphenyl
PG&E	Pacific Gas & Electric Company
ppm	Parts per million
PRG	Preliminary remediation goal
QA	Quality assurance
QC	Quality control
RACER	Remedial Action Cost Engineering and Requirements
RAO	Remedial action objective
RAP	Remedial action plan
RAWP	Remedial action work plan
RCRA	Resource Conservation and Recovery Act
RI	Remedial investigation
ROD	Record of decision
RWQCB	California Regional Water Quality Control Board
SAR	Sodium adsorption ratio
SMHM	Salt marsh harvest mouse
S/S	Solidification and stabilization
STAECRU	SulTech Indefinite Quantity Contract for Architectural-Engineering Services to Provide CERCLA/RCRA/UST Studies
SulTech	A joint venture of Sullivan Consulting Group and Tetra Tech EM Inc.
SVOC	Semivolatile organic compound
SWRCB	State Water Resources Control Board
TBB	Taylor Boulevard Bridge
TBC	To be considered
TCLP	Toxicity characteristic leaching procedure
TCRA	Time-critical removal action
TPH	Total petroleum hydrocarbons
TOC	Total organic carbon
TRPH	Total recoverable petroleum hydrocarbons
95UCL	95^{th} percent upper confidence limit

USACE	U.S. Army Corps of Engineers
USFWS	U.S. Fish and Wildlife Service
UST	Underground storage tank
VOC	Volatile organic compound
WET	Waste extraction test
yd^3	Cubic yards

EXECUTIVE SUMMARY

This draft report summarizes the engineering evaluation and cost analysis (EE/CA) process, characterizes the site, identifies removal action objectives, describes and analyzes removal action alternatives, and provides a comparative analysis of the alternatives for the non-time-critical removal action (NTCRA) at Site 30 located at the Taylor Boulevard Bridge (TBB) at the Naval Weapons Station Seal Beach Detachment Concord (NWS SBD Concord) in Concord, California. This report was prepared in accordance with current U.S. Environmental Protection Agency and Department of the Navy guidance documents for a non-time-critical removal action.

SITE BACKGROUND

Site 30 is located below the TBB on land adjacent to Seal Creek Marsh. Site 30 consists of an abandoned disposal site. Visible waste at the site consisting of broken glass, burned metal, and partially burned wooden railroad ties litters the ground surface at much of the site. Pickleweed borders most of the shoreline of the site.

Previous investigations at the TBB Disposal Site include five initial soil and sediment sampling events, focused sampling for the ecological risk assessment (ERA), and groundwater sampling conducted as part of the remedial Investigation (RI) for the site. A screening-level human health risk assessment (HHRA) and ERA, which were conducted as part of the baseline ecological risk assessment (BERA), were also conducted as part of the RI process for the site.

The primary chemicals of concern at the site are arsenic, cadmium, copper, chromium, iron, lead, mercury, selenium, and zinc. The current level of inorganic chemical contamination at the site poses probable risk to plant, invertebrate, and bird and mammal receptors. Because a marsh and pickleweed are present at the site, the salt marsh harvest mouse, a threatened and endangered species, is presumed present at the site and is therefore presumed to be at risk as well. Areas with the highest levels of contamination by inorganic chemicals are located where the debris is most concentrated, which is along the shoreline and in the center of the site. A risk footprint that shows the overlap of risk to each receptor by location was developed to identify the areas of highest risk to help establish the boundary for remedial action (Figure 5).

REMOVAL ACTION OBJECTIVES

The presence of chemicals in the soil and debris at Site 30 presents a potential risk of exposure for human and ecological receptors. Because the site is infrequently used by humans, the potential threat of exposure to human health at Site 30 does not warrant an emergency or time-critical removal action (TCRA). However, the ecological risk posed by the site is significant and warrants the proposed NTCRA.

The proposed NTCRA removal action will be undertaken under the National Oil and Hazardous Substances Pollution Contingency Plan (NCP) (Title 40 of the Code of Federal Regulations, Part 300), the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), and California Health and Safety Code (Ca-HSC) Section 25323. All of these regulations and statutes define removal actions as the cleanup or removal of released hazardous

substances, actions to monitor the threat of release of hazardous substances, and actions to mitigate or prevent damage to public health or welfare or the environment.

Based on CERCLA and the NCP, the remedial action objectives (RAOs) for the site are as follows:

- Promote overall protection of human health and the environment.
- Restrict the potential for humans and other ecological receptors to contact chemical- or solid-waste-contaminated soil near the ground surface within Site 30.

The following criteria are considered action levels for excavation of common areas within known solid waste disposal areas in this EE/CA for Site 30:

- Lead – The maximum concentration of lead outside of the risk footprint (268 mg/kg) for which risk was not indicated to either ecological or human receptors will be used as the action level within the footprint for risk and debris.
- PAHs – the concentration in soil at the benzo(a)pyrene-equivalent concentration of 0.62 mg/kg (the site-specific criterion)
- Solid-waste-contaminated soil – visual observations will be used to verify that solid-waste-contaminated soil is fully removed both vertically and laterally.

REMOVAL ACTION ALTERNATIVES

Three remedial alternatives for addressing the contaminated soils, sediments, and debris were identified and developed under this EE/CA:

Alternative 1:	No action with monitoring
Alternative 2:	Excavation, confirmation sampling, on-site disposal, land use controls (LUCs), and habitat restoration
Alternative 3:	Excavation, confirmation sampling, off-site disposal, and habitat restoration

COMPARATIVE ANALYSIS OF REMOVAL ACTION ALTERNATIVES

A comparative analysis was conducted to evaluate the relative performance of each alternative. Each alternative was evaluated considering the NCP criteria of overall protectiveness of human health; compliance with applicable or relevant and appropriate requirements; long-term effectiveness; reduction of mobility, toxicity, or volume through treatment; short-term effectiveness; implementability; and cost.

Alternative 1 does not include remedial action, but evaluation of Alternative 1 is required under CERCLA. Alternative 1 does not provide adequate protection for human health under restricted use or reduce ecological risks. Alternative 1 therefore does not meet the RAOs and is not expected to receive community or regulatory agency acceptance. Alternatives 2 and 3 are both effective in the long term and provide the maximum protection of human health and the environment. The total cost for Alternative 1, "No Action with Monitoring" is estimated at $330,000. The total costs for Alternatives 2 and 3 are estimated at $1.6 million each. The estimated cost, for Alternative 3 can be reduced to $652,000 if analytical testing demonstrates that the landfill at site 1, Naval Weapons Station Seal Beach Detachment Concord (NWS SBD Concord) in Concord, California can accept the excavated debris and soil.

The individual and comparative analyses indicate that both Alternative 2 and 3 will provide acceptable levels of protection of human health and the environment and of long-term effectiveness and will comply with applicable or relevant and appropriate requirements.

RECOMMENDED ALTERNATIVE

Based on the comparative analysis of the removal action alternatives, the Navy recommends Alternative 3. Alternative 3 best meets the NCP criteria of overall protection of human health and the environment; compliance with ARARs; long-term effectiveness; implementability and cost.

1.0 INTRODUCTION

This draft engineering evaluation and cost analysis (EE/CA) addresses proposed removal action alternatives for the Taylor Boulevard Bridge (TBB) Site (Site 30) at the Naval Weapons Station Seal Beach Detachment Concord (NWS SBD Concord) in Concord, California. Site 30 is a marsh adjacent to an upland transition area. There are no paved areas, no buildings, and no constructed improvements at the TBB Disposal Site. The nearest improvements are the TBB and the Taylor Boulevard Railroad Bridge, which span the area adjacent to the eastern side of the site.

1.1 DESCRIPTION OF THE NON TIME-CRITICAL REMOVAL ACTION AUTHORITY AND THE PURPOSE OF THE ENGINEERING EVALUATION/COST ANALYSIS

The purpose of a non-time-critical removal action (NTCRA) is to conduct action that reduces a threat to human health or the environment. This EE/CA develops, compares, and evaluates removal action alternatives for a planned NTCRA. The planned removal action is intended to serve as the final remedy for Site 30. The final remedy will eventually be selected using the methods of Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) and will be recorded in a record of decision (ROD).

CERCLA and the National Oil and Hazardous Substances Pollution Contingency Plan (NCP) (Title 40 of the Code of Federal Regulations [40 CFR] Part 300) define removal actions to include the following:

> "The cleanup or removal of released hazardous substances from the environment, such actions as may necessarily be taken in the event of the threat of release of hazardous substance into the environment, such action as may be necessary to monitor, assess, and evaluate the release or threat of release of hazardous substances, the disposal of removal material, or the taking of such other actions as may be necessary to prevent, minimize, or mitigate damage to the public health or welfare or to the environment, which may otherwise result from a release or threat of release."

This EE/CA evaluates proposed removal action alternatives that are intended to reduce the likelihood of exposure of human or ecological receptors to contaminated soil and sediment from the TBB Disposal Site at NWS SBD Concord.

The U.S. Environmental Protection Agency (EPA) has classified removal actions into three types, based on the circumstances surrounding the release or threat of release:

- An emergency removal action, where on-site cleanup activities are initiated within hours after a release or threat of a release has been verified.
- A time-critical removal action (TCRA), where based on the site evaluation, a period of 6 months or less exists before on-site removal activities must be initiated.

- An NTCRA, where the on-site action will be taken more than 6 months after the planning period begins.

The potential threat of exposure to human health and the environment at the TBB Disposal Site does not warrant an emergency or TCRA because the risk is relatively low.

In addition to this EE/CA, the California Health and Safety Code (Ca-HSC) specifically requires preparation of documentation for planned removal actions. The type of documentation required depends on the projected cost of the removal action. The Ca-HSC requires development of a remedial action plan (RAP) for removal actions that cost $1 million or more or a removal action work plan (RAWP) for removal actions projected to cost less than $1 million. Further, the Ca-HSC authorizes the California Environmental Protection Agency (Cal/EPA), Department of Toxic Substances Control (DTSC), to waive the requirements for a RAP in favor of a RAWP for removal actions taken in response to an imminent or substantial endangerment. DTSC also may waive the RAP requirements of Ca-HSC Sections 25356.1(d)(l) through (6) if a RAWP document is prepared that meets the requirements of Ca-HSC Section 25356.l(h)(3).

This EE/CA for a NTCRA at Site 30 addresses the implementability, effectiveness, and costs of the removal action alternatives, along with applicable regulatory requirements. The Navy is the lead agency for removal actions at Site 30. As the lead agency, the Navy has the authority to select the alternative, considering public and regulatory comments. The Navy is working in cooperation with DTSC, EPA, the U.S. Fish and Wildlife Service (USFWS), the California Department of Fish and Game (CDFG) and the Regional Water Quality Control Board (RWQCB) to implement this removal action.

1.2 SCOPE OF THE ENGINEERING EVALUATION/COST ANALYSIS

Site 30 (Figure 1) was identified in late 1995 during a remedial investigation (RI) conducted at four nearby Tidal Area sites. Sediment samples from borings in Site 30 and the surrounding area were collected in February 1996, March 1997, October 1997, February 1998, and June 1998 to assess the nature and extent of chemical contamination at Site 30. These evaluations indicated that concentrations of inorganic chemicals (primarily lead) at the center of Site 30 were higher than were detected in surrounding areas and posed a potential risk to both human health and the environment. Based on the conclusions of the RI (Tetra Tech 2002, 2004), the Navy proposed a removal action to mitigate the risk to the environment.

A screening-level human health risk assessment (HHRA) and a screening-level ERA (ERA) were conducted in August 1999 (Tetra Tech 1999a). The studies concluded that, although the site posed potential risks to human health, threats to ecological receptors were determined to be the primary risk drivers at the site because of the presence of wetlands, the potential presence of special status species, and the limited human access to the site. The site remediation necessary to mitigate the risk to animal receptors would also be expected to mitigate the risk to humans, even under the application of extremely conservative assumptions about human contact with the site.

A baseline ERA (BERA) was conducted as part of the Site 30 RI report from February through March 2000 to assess the threat to potential ecological receptors posed by the presence of

wetlands, and special status species (Tetra Tech 2002). The BERA evaluated the four ecological receptors: wetland and upland transitional plants, benthic invertebrates, aquatic birds (represented by the black-necked stilt [*Himantopus mexicanus*] and the Mallard duck [*Anas platyrhynchos*]), and small mammals (represented by the salt marsh harvest mouse (SMHM) [*Reithrodontomys raviventris*]) and established a risk footprint as a boundary for potential remedial action. The BERA indicated that removal of the debris would significantly reduce risk to both aquatic and wetland receptors.

After a review of all the data, the regulatory agencies identified the following data gaps: (1) groundwater characterization, (2) vertical extent of debris, and (3) characterization of the inorganic and organic chemicals present in sediment beneath the debris. Therefore, the Navy prepared an RI addendum to address those issues (Tetra Tech 2004).

Based on the evaluations of the spatial distribution of chemicals in sediments, soil, and groundwater, adequate data are available to show that inorganic concentrations in the area of debris at Site 30 are sufficiently high to present a potential risk to plants, benthic invertebrates, and aquatic birds. They also are high enough to pose a significant risk to the SMHM. It is evident that remedial action is necessary to reduce the potential risk to human health and the environment. Therefore, an NTCRA was recommended for Site 30.

1.3 DESCRIPTION OF THE SITE AND CONCEPTUAL MODEL

Debris that consists of broken glass, burned metal, and partially burned wooden railroad ties litters the ground surface at much of the site. Glass and metal debris cover a triangular area that extends about 180 by 180 feet and into the open water and onto a peninsula (Figure 3). The lateral and vertical distribution of the debris is shown in Figure 4. Surface vegetation covers the debris in most areas. Figure 5 was developed to graphically depict the conceptual site model (CSM). This figure conceptually shows the areas where soil and sediment have been contaminated and require action to mitigate the potential risk to human health and the environment.

1.4 POTENTIAL THREATS TO HUMAN HEALTH FROM SITE CONTAMINANTS

Currently, Site 30 is accessible only to authorized personnel. There are no current plans for base closure, and the site use is not expected to change in the near future. Potential carcinogenic risks and noncarcinogenic hazards were calculated for the HHRA based on the ratio of contaminant concentrations detected to residential preliminary remediation goals (PRGs). It is highly unlikely that the site would ever be developed for residential housing, since Site 30 currently consists of a marsh that is not be suitable for residential development without significant alteration.

Assuming that the disposal site is developed for residential use and that no remediation is conducted at the site, the concentrations of lead in soil and sediment could result in a child blood-lead concentration greater than 10 micrograms per deciliter (µg/dL), which is the level of concern.

However, assuming that soil and sediment within the areas of the highest levels of inorganic concentration are removed, the risks identified at the disposal site would be protective of human health.

1.5 POTENTIAL THREATS TO ECOLOGICAL RECEPTORS FROM SITE CONTAMINANTS

The current level of inorganic chemical contamination at the site poses probable risk to plant, invertebrate, and bird receptors. The risk to the salt marsh harvest mouse, a threatened and endangered species, is significant. Areas with the highest levels of inorganic chemicals are located where the debris is most concentrated, which is along the shoreline and in the center of the site. Removal of the debris would significantly reduce risk to both aquatic and wetland receptors.

1.6 PLANNED REMOVAL ACTION TO ACHIEVE HIGH LEVEL OF PROTECTION FOR HUMAN HEALTH AND THE ENVIRONMENT

CERCLA and the NCP define removal actions to include actions that may be necessary to prevent, minimize, or mitigate damage to the public health or welfare or to the environment, which may otherwise result from a release or threat of release.

The public is encouraged to review and comment on the proposed removal activities described in this EE/CA. The complete record of environmental investigations conducted at NWS SBD Concord is maintained at the information repository located at:

Concord Public Library
2900 Salvio Street
Concord, California 94519
(925) 646-5455

2.0 SITE CHARACTERIZATION

The following sections describe Site 30 at NWS SBD Concord. The site location, regional and site land use, history, and current operations are described.

2.1 SITE DESCRIPTION AND BACKGROUND

This section discusses the location and the background of the TBB Disposal Site.

2.1.1 Site Location

NWS SBD Concord is located in the north-central portion of Contra Costa County, California, about 30 miles northeast of San Francisco. The facility encompasses about 13,000 acres and is bounded by Suisun Bay to the north and by the City of Concord to the south and west (Figure 1). Currently, the facility includes two principal areas: the Tidal Area, and the Inland Area. The

Tidal Area encompasses about 6,800 acres, the majority of which are wetlands. Site 30 is located in the Tidal Area beneath TBB (Figure 2). Taylor Boulevard is the main access road to the Tidal Area.

Access to Site 30 is through a guarded gate off of Port Chicago Highway, west of the main entrance to the Inland Area. Public access is restricted.

Site 30 is a marsh adjacent to an upland transition area (Figure 2). It has no paved areas, no buildings are present, and no physical evidence exists of any previous construction at the site. The nearest improvements are the TBB and the Taylor Boulevard Railroad Bridge, which span the eastern side of the site. The elevation at the center of the site is 6 feet higher than the surrounding marsh. No portion of the site is higher than 12 feet above mean sea level (msl). The Burlington Northern Santa Fe Railroad Company (BNSF) tracks are immediately south of the site, and Waterfront Road and the Union Pacific Railroad tracks are immediately north of the site.

Site 30 is triangular and is bordered by wetlands (referred to as Seal Creek Marsh) to the south and west (Figure 2). Seal Creek Marsh, adjacent to the site, is mostly open water, although the depth of the water varies seasonally. Pickleweed (*Salicornia virginica*) borders most of the shoreline.

Debris consisting of broken glass, burned metal, and partially burned wooden railroad ties litters the ground surface at much of the site. Glass and metal debris cover a triangular area that extends about 180 by 180 feet and into the open water and onto a peninsula (Figure 4). Surface vegetation covers the debris in most areas.

2.1.2 Site Background and Historic Operations

The region that encompasses NWS SBD Concord was originally identified as Bay Point. The Tidal Area was originally occupied by the Pacific Coast Shipbuilding Company. The shipyard occupied the coastal area north of Site 30. Johnson Road was the only major route into the Tidal Area. In 1927, the Navy chose the site for naval ordnance operations because of its remote location and the availability of three major rail lines. Two of these rail lines bound Site 30 to the north and south (Figure 2). The rail lines were reportedly constructed before 1940. Construction of the waterfront handling facilities began in January 1942, and the facility was commissioned as the Naval Magazine Port Chicago in April 1942. Around this time, the name Bay Point was changed to Port Chicago. The Inland Area, located in the Diablo Creek Valley, was subsequently acquired and linked to the Tidal Area by the Port Chicago and Clayton Railroads. In 1963, the base was officially renamed Naval Weapons Station Concord. In April 1998, the base became the Weapons Support Facility Seal Beach, Detachment Concord.

On July 7, 1944, two munitions ships docked at a pier adjacent to the Tidal Area exploded. The pier and both ships were destroyed, and 320 people were killed. Nearby residents in Port Chicago were injured. Therefore, the Navy acquired all land within a 2-mile radius of the loading piers to protect the civilian population. The towns of Port Chicago and Nichols were

purchased and demolished between 1968 and 1972 to provide a safety zone. The former town sites are now in the Tidal Area.

Seven aerial photographs from 1952 to 1996 and recent site visits suggest that Site 30 has not been graded for more than 45 years (Pacific Aerial Surveys [PAS] 1952, 1959, 1974 1984; PRC 1996). Slight changes in the site can be seen in each of the photographs, but there is no evidence of grading. The TBB and the railroad bridge immediately east of the disposal site were constructed sometime between 1939 and 1950. Changes in vegetation over time are apparent, but these changes may occur because the photographs were taken in different seasons. The most notable change over time is the variation in the degree of inundation of Seal Creek Marsh. Although Seal Creek Marsh is readily identified in the aerial photographs, the degree of site inundation varies significantly, probably with rainfall patterns. For example, marsh flooding is not apparent in photographs before August 6, 1996 (PAS 1952, 1959, 1974, 1984), but Seal Creek Marsh is inundated in the photographs for August 6, 1996 (PRC 1996).

The dates of debris disposal and the source of the debris at the site are unknown. The debris includes a variety of blue-colored glass bottles and ceramic fragments. The waste appears to be old, consistent with the conclusions about the disposal area based on a review of aerial photographs.

2.1.3 Regional and Current Land Use

Regional land use at NWS SBD Concord is diverse, including industrial and residential areas, rangeland, and open space. Railroad land holdings and utility easements cross through the Tidal Area. Los Medanos Hills (Figure 2) separate the Tidal and Inland Areas of NWS SBD Concord. This land is privately owned and is leased to the Pacific Gas and Electric Company (PG&E) and to ranchers for cattle grazing. Land north of State Route 4 (Figure 2) and west of NWS SBD Concord is zoned for industrial development. Several industrial firms operate along Port Chicago Highway near the main gate to NWS SBD Concord. Tosco Avon Refinery Company and Monsanto Chemical Company maintain facilities along Solano Way near Waterfront Road.

Currently, NWS SBD Concord is the major naval explosive ordnance transshipment facility on the West Coast. The facility provides storage, maintenance, and technical support for ordnance operations. Although daily operation of the facility has been transferred to the U.S. Army, responsibility for environmental cleanup will remain with the Navy into the near future. No plans currently exist for base closure.

Site 30 is undeveloped and is not currently used for any purpose by NWS SBD Concord.

2.1.4 Geology

Naval Weapons Station SBD Concord is located about 30 miles east of the San Francisco Bay, within the geologically complex and tectonically active California Coast Range. The Tidal Area (Figure 1), which includes Site 30, lies within the southern part of a structural trough that is partially occupied by Suisun Bay. The Tidal Area is characterized by artificial fill material that overlies fine-grained Bay Mud sediments in elevated areas. Surface materials were naturally deposited in some areas, and no filling has occurred.

2.1.5 Hydrogeology

Regional and local hydrologic and hydrogeologic environments of the Tidal Area at NWS SBD Concord are presented in this section. Hydrologic data were derived from various surface and subsurface field investigations. Hydrogeologic data are based on geologic maps, data from subsurface field investigations in the Suisun Bay and Carquinez Strait area, and published materials (Tetra Tech 2002).

The Tidal Area, which includes Site 30, is characterized by a highly irregular piezometric surface and a very thin (or absent) vadose zone. Surface water features in the Tidal Area recharge local groundwater zones or act as a point of groundwater discharge. Groundwater from the surrounding hills flows northward toward Suisun Bay and discharges to surface waters in the Tidal Area. Surface water from the surrounding hills flows northward, toward Suisun Bay, in creeks and artificial ditches, canals, and culverts.

Groundwater at the Tidal Area occurs in a shallow, unconfined water-bearing zone that is composed of silty clays. As NWS SBD Concord grew, drainage was modified by addition of drainage channels and by filling both natural and manmade channels with sandy fill materials and silty clays. The result is a complex subsurface characterized by silty clays and linear bodies of sandy fill material.

Tidally influenced sloughs in the lowlands near Suisun Bay route bay water to and from the Tidal Area. Hastings Slough, in the western portion of the Tidal Area, extends from Suisun Bay to the Tosco Avon Refinery in Martinez. Mount Diablo Creek (called Seal Creek by NWS SBD Concord) drains into Hastings Slough. Seal Creek and Hastings Slough are tidally influenced sloughs adjacent to Site 30. Although Seal Creek and Hastings Slough are tidally influenced, significant tidal fluctuation does not extend into Seal Creek Marsh. Based on repeated field observations, water levels at Site 30 fluctuate less than 6 inches during daily tidal cycles.

Groundwater in the Tidal Area is generally a few feet below ground surface (bgs) throughout the year. Groundwater elevations at Site 30 are less than 1 foot bgs at the margin of Seal Creek Marsh. The drainage pattern of Seal Creek Marsh near Site 30 has been altered through the years by manmade features. Active railroad lines border Site 30 to the north and south (Figure 2). In addition, drainage ditches dug by the Contra Costa County Mosquito Abatement District are present in Seal Creek Marsh.

Four major hydrogeologic units were identified beneath the Tidal Area within 100 feet of the surface. The four units were (1) bay sediments (clay with sand and peat stringers), (2) Yerba Buena mud (clay with minor sand lenses), (3) recent alluvium (including sands, silts, and clays), and (4) fluvial or estuarine sediments (predominantly micaceous sand). In addition, artificial fill is present in the upper surface at several locations in the Tidal Area, particularly at Site 30. Recent alluvium and bay sediments, consisting of silty clay, may be the only hydrogeologic units present at Site 30.

2.1.6 Regional Ecology

Site 30 can be subdivided into three habitats (Figure 3): an open water aquatic habitat, a transitional shoreline, and a wetland and upland transitional habitat that appears to be strongly influenced by moisture levels in soil. Three dominant vegetation types are present in the wetland and upland transitional habitat (Figure 3); however, a true upland plant community is not present at Site 30.

2.1.6.1 Aquatic Habitat

The aquatic habitat consists of shallow, open water of varying salinities, interspersed with "islands" of vegetation; dense pickleweed root systems and thick algal mats are abundant in the shallowest waters. The dominance of algal mats varies with season, as does the composition of the algal species. Cattail clumps occur in deeper areas. The bottom appears to be a rich organic matrix of decaying algae and detritus. This habitat may contain amphipod species, clams, polychaete worms, and other species of filter- and deposit-feeding benthic invertebrates.

2.1.6.2 Shoreline

The shoreline is the transition area between the aquatic and wetland and upland transitional habitats. The boundary of the shoreline fluctuates over time because of seasonal variation in the water level of Seal Creek Marsh, resulting from annual rainfall and tidal influence. For this reason, the shoreline is included as part of both the aquatic and wetland and upland transitional habitats. The shoreline is shown in stippled colors on Figure 3.

The dominant plant along the shoreline is pickleweed. The plant is a colonial halophyte that reproduces both vegetatively and by seed, resulting in dense stands. Pickleweed is adapted to highly saline habitats, absorbing salt and water through its roots and storing salt in aboveground tissues. Pickleweed, with its elaborate root system, traps detritus and sediment particles, which produce rich organic sediment; this sediment serves as a primary food source for many benthic invertebrates, particularly deposit and filter feeders. This moist, shaded pickleweed niche is the home for numerous benthic invertebrates, including various amphipod species.

2.1.6.3 Wetland and Upland Transitional Habitat

The shoreline comprises the lowest region of the wetland and upland transitional habitat (Figure 3). Gumplant (*Grindelia* sp.) grows in dense clumps interspersed among the pickleweed on the tip of the peninsula and in the eastern portion of this lowest region.

Grasses such as saltgrass (*Distichlis spicata*), are abundant in the mid-region of the wetland and upland transitional habitat. Gumplant is also common. Gumplant often grows interspersed among the grasses, forming loosely spaced aggregations. Australian salt bush (*Atriplex semibaccata*) and spearscale (*Atriplex triangularis*) are also present, randomly growing among the grasses. Curly dock (*Rumex crispus*) occurs in small numbers. Alkali heath (*Frankenia salina*) also occurs sporadically.

Grasses are less abundant and shrubs dominate in the upper region of the wetland and upland transitional habitat. Coyote brush (*Baccharis pilularis*), fennel (*Foeniculum vulgare*), and artichoke thistle (*Cynara caradunculus*) occur throughout this region. Gumplant is also present, but generally in smaller numbers, with the exception of a dense stand in the southwestern corner of the habitat.

The factor that probably controls plant distribution within the wetland and upland transitional habitat is soil moisture. The moisture content of surface soil declines and the abundance of obligate wetland species decreases as the elevation at Site 30 increases from sea level to 10 feet and distance from the shoreline increases.

2.1.7 Climate and Meteorology

Contra Costa Country normally has dry, warm summers and cool, moderately wet winters. Mean annual precipitation for NWS SBD Concord is 14 inches (Ecology and Environment 1983). About 84 percent of the rainfall occurs from November through March. Regional rainfall varies from 13 inches in the eastern portion of Contra Costa County to more than 30 inches on the upper slopes of Mount Diablo.

The average local temperature varies from 45°F in January to 75°F in August. Record highs and lows of 106°F and 16°F were recorded near NWS SBD Concord.

Prevailing winds blow from the west through the wind gap formed by San Francisco Bay and Carquinez Strait. As a result, the Pacific Ocean and Suisun Bay have a moderating effect on the microclimate of NWS SBD Concord. These westerly winds are dominant during the summer and minimal from November through February. Wind directions and speed are monitored at a PG&E power plant in Pittsburg, a few miles east of NWS SBD Concord. The wind blows from southwest to west-northwest at a mean speed of 12 miles per hour 65 percent of the time.

2.2 HISTORY OF PREVIOUS REMOVAL ACTIONS, INVESTIGATIONS, AND ACTIVITIES

This section discusses previous removal actions, initial and remedial investigations, and sampling activities. Previous investigations at the Site 30 include five initial soil and sediment sampling events, sampling focused for the ERA, and groundwater sampling conducted as part of the RI process for the site. A screening-level HHRA and BERA were also conducted as part of the RI for the site.

2.2.1 Previous Removal Actions

No previous removal actions have been conducted at Site 30.

2.2.2 Initial Investigations

A summary of the initial investigations at Site 30 is presented in Table 1.

2.2.3 Remedial Investigations

In August 1999, a final report and summary work plan summarized available data and presented a screening-level HHRA and a screening-level ERA (Tetra Tech 1999b). A BERA was recommended based on the conclusions of the screening level ERA. Additional samples to address the data needs of the BERA were collected February to March 2000 as part of a supplemental RI; that data are presented in Table 1.

2.3 NATURE AND EXTENT OF CONTAMINATION AND DEBRIS

The following sections summarize the nature and extent of contaminants and debris at Site 30 for inorganic and organic chemicals in sediment and groundwater. Figure 3 shows sampling locations for surface and subsurface sediment samples, composite sediment samples, collocated tissue samples, debris sample locations, and monitoring wells. Pickleweed and amphipod tissue samples were analyzed for metals and percent moisture. Table 2 summarizes the evaluation of sediment and groundwater for Site 30.

2.3.1 Extent of Site Debris

Test pits were dug at 22 locations across Site 30 to characterize the vertical and lateral extent of the debris present at the site. These test hole locations are identified by triangular symbols on Figure 3 and are numbered DB01 through DB22. Profiles of the debris test holes with soil type and vertical extent of debris are illustrated on Figure 4.

The vertical extent of the debris ranges from 4 feet bgs at the end of the peninsula (SB201) to 1 foot bgs in the central portion of the site (SB-205) (Figure 4).

The peninsula of Site 30 contains the greatest amount of debris. The subsurface debris along the peninsula consists primarily of glass fragments, intact glass bottles, and what appears to be highly rusted metal debris (rust flakes and fragments). The rusted material is essentially mixed with the small amount of sediment that composed the debris matrix on the peninsula. No intact metal containers or pieces of metal that resembled containers were recovered in the test holes dug on the peninsula. Generally, the debris was contained in an approximately 50/50 matrix of soil and debris near the surface in test holes where debris was found (0 to 0.5 feet bgs) and was graded to nearly 100 percent debris with depth. The debris in the peninsula area extends to 3.5 feet bgs (Tetra Tech 2002; 2004).

Debris was not found in most of the debris test holes dug on the eastern side of the site, except in test holes DB01, DB11, DB12, and DB13 (Figures 3 and 4). Based on test hole findings, surface and subsurface debris in the wetland and upland transitional habitat is found throughout the peninsula, north to DB013, and extending southeast to just west of DB05. This area is delineated on Figure 3. Subsurface debris was generally found in those areas where debris was observed on the surface.

The extent of debris in the aquatic portion of Site 30 was estimated by probing the submerged sediments of the offshore area with a shovel and a 5-foot length of plastic pipe. Based on these methods, debris appears to extend about 10 to 20 feet offshore from the debris area identified on the "wetland and upland transitional" portion of the site (Figures 3 and 4). This debris appears to extend down 1 to 2 feet below the sediment surface. About 6 inches of sediment covers the debris in the area south of the peninsula. The debris appears to be heaviest close to the shoreline and is mixed with sediment in most areas. The stippled offshore area shown on Figure 3 delineates an area of scattered surface debris, based on sediment probing conducted while field crews traversed this area.

2.3.2 Extent of Site Sediment and Groundwater Contamination

Arsenic, cadmium, copper, lead, selenium, and zinc were detected in sediment beneath the debris at concentrations above benchmark screening values (Tetra Tech 2002, 2004). Concentrations of metals were highest on the peninsula in areas where the debris extends into the groundwater. Concentrations beneath the debris were not elevated at location SB205, however, which is in the center of the site where debris does not intersect groundwater, (Tetra Tech 2002). Surface sediment or water samples collected about 10 feet offshore did not contain elevated levels of metals (Tetra Tech 2002). The sediment data collected suggest that leaching from the debris to subsurface sediment may be occurring in low-lying areas of the site closest to the shoreline, where the debris is within the groundwater.

The distribution of total petroleum hydrocarbons (TPH) in the sediment samples suggested a limited release of petroleum hydrocarbons, possibly caused by leakage of oil from construction vehicles and equipment dating from the construction of the Taylor Boulevard automobile and railroad bridges (Tetra Tech 2002).

The three groundwater monitoring wells installed were sampled using low-flow-rate sampling methodology (Tetra Tech 2004). The groundwater level measurements recorded in November

2003 at the beginning of the wet season and then again in February 2004 at the end of the wet season indicated that groundwater flowed to the west (0.002 foot per foot gradient) and that the potentiometric surface was relatively flat (Tetra Tech 2004). Results from groundwater sampling are summarized in Table 2.

Although aluminum, arsenic, copper, mercury, and nickel were detected at concentrations above groundwater screening criteria, only arsenic and aluminum were notably elevated above screening criteria (Tetra Tech 2004). Aluminum is not expected to be a problem because the pH of the soil is relatively neutral.

The highest concentration of arsenic was detected in the sample from monitoring well GW01, which is upgradient of the debris field. The exact source of arsenic in the sample from monitoring well GW01 is unknown; however, it is most likely related to the debris. The hydraulic gradient for the site is nearly flat which, along with the generally low hydraulic conductivity in the subsurface, suggests that the rate of groundwater flow across the site is very low. Therefore, potential groundwater transport of arsenic from the debris is not expected to result in elevated concentrations of arsenic at significant distances from the waste. Surface water transport could cause elevated concentrations of arsenic in groundwater if groundwater near the debris was discharging to surface water and arsenic-containing surface water was then recharging the groundwater near well GW01. Well GW01 is about 40 feet from the primary area of debris. Surface water samples collected by the San Francisco Bay RWQCB do not suggest that arsenic has been released from groundwater at the site at concentrations that may be causing adverse ecological effects (Tetra Tech 2002).

Areas with the highest levels of inorganic chemical contamination are located where the debris is most concentrated, along the shoreline and in the center of Site 30. Removal of the debris would significantly reduce risk to both aquatic and wetland receptors.

2.3.3 Contamination Fate and Transport

Inorganic chemicals (primarily metals) are the main chemicals of concern. The primary migration pathway for these chemicals at Site 30 is through leachate migration generated by surface water infiltration. It appears that chemicals have not migrated vertically by leaching (Tetra Tech 2002), as evidenced by the lack of soil contamination at depths below 1 foot bgs. Information on the hydrology and geochemistry indicates that inorganic chemicals will not leach into the surface water. For example, the high pH of the soils (7.5 to 8.2) (Tetra Tech 2002) indicates that the metals are in less soluble form and are more likely to bind to the soil, in turn reducing the leaching potential of metals. In addition, there is very little inundation of the contaminated soils because water levels at Site 30 fluctuate less than 6 inches during daily tidal cycles (Tetra Tech 2002), and therefore the likelihood that metals would leach through surface water infiltration is remote. The less soluble forms of metals would likely bind to the highly organic soils in the submerged area of the wetland, reducing the opportunity for contaminant migration. Furthermore, the RWQCB surface water data collected in December 2001 indicate that Site 30 is not a source of contamination to Seal Creek Marsh (Tetra Tech 2002).

Based on analytical results, contaminant concentrations were highest on the peninsula in areas where the debris extends into the groundwater. However, contaminant concentrations beneath the debris were not elevated at the sampling location in the center of the site, where debris does not intersect groundwater. The results of the 2003 investigation of groundwater suggest that leaching from the debris to subsurface sediment may be occurring in low-lying areas of the site closest to the shoreline, where the debris is within the groundwater.

2.4 TAYLOR BOULEVARD BRIDGE RISK EVALUATION

A screening-level human health and baseline ecological risk evaluation was performed as part of the RI for Site 30. Lead-contaminated debris is the primary contaminant of concern and source of risk to potential human receptors. Therefore, the site remediation criteria are based primarily on ecological risk. The following sections summarize the risk evaluation as presented in the RI and RI addendum (Tetra Tech 2002, 2004). Although the site does pose a risk for potential human receptors, humans are not likely to use the property as residents. A greater risk is posed to ecological receptors.

2.4.1 Summary of Human Health Risk Evaluation

The screening-level HHRA conducted for Site 30 indicated that chemicals of potential concern (COPC) are currently present at levels that could result in adverse health effects for residents. The data used in the evaluation included results from investigations in February 1996, March and October 1997, February and June 1998, and February 2000. COPCs were selected from the pooled data from these investigations. All detected chemicals were selected as COPCs, with the exception of metals. Metals were selected as COPCs only if the maximum detected concentration was above the 99th percentile of the Tidal Area ambient level or if it was not considered an essential nutrient. The 95 percent upper confidence limit (UCL_{95}) was then calculated for each COPC selected.

The potential carcinogenic risks and noncarcinogenic hazards were estimated based on comparing the UCL_{95} to residential EPA Region 9 residential preliminary PRGs. Human health-based target limits for each of the COPCs were selected considering the residential exposure scenario. This scenario is highly conservative because Site 30 is currently a tidal marsh and would not be suitable for a future residential development. However, the residential scenario provides health-protective target criteria without imposing land use restrictions; therefore, residential PRGs were used as a benchmark to confirm that site conditions after remediation will be protective of human health for all possible future uses. Site 30 was subdivided into two areas for the screening evaluation: (1) Area A, the center of the site where concentrations of lead exceeded 400 milligrams per kilogram (mg/kg) (the 1999 residential PRG for lead), and (2) Area B, the remaining area outside of Area A (the 400 mg/kg isopleth for lead).

The ratio of the UCL_{95} concentration to the residential PRG ratio was multiplied by 1×10^{-6} for the evaluation of carcinogenic risk. The sum of the carcinogenic ratios within Area A was 4×10^{-4}. The COPCs the yielded results greater than 1×10^{-6} were arsenic, cadmium, chromium, benzo(a)pyrene, and benzo(b)fluoranthene. The hazard index (HI) was estimated by calculating the ratio (UCL_{95}/noncancer endpoint residential PRG) for the noncancer hazard evaluation. An

HI of 1 indicates that no noncancer adverse health effects are expected to occur as a result of exposure to on-site COPCs. The sum of the HIs was 22 for Area A, indicating the potential for adverse health effects from residential use of the site. The individual HI for arsenic, copper, and iron was greater than 1.

The Area A UCL_{95} concentration for lead (3,470 mg/kg) exceeds the EPA Region 9 PRG.

The sum of the carcinogenic ratios within Area B was 3×10^{-5}. Arsenic was the only COPC with an estimated risk that exceeded 1×10^{-6}. The HI of 4 indicates the potential for adverse health effects from residential use of Site 30. Iron was the only COPC with an individual HI greater than 1. The Area B UCL_{95} concentration for lead (210 mg/kg) is below the EPA Region 9 PRG.

Based on the results of the screening evaluation conducted in the RI (Tetra Tech 2002), the following COPCs were identified as risk or hazard drivers to human health (estimated risk above 1×10^{-6} or HI above 1): arsenic, cadmium, copper, chromium, iron, lead, benzo(a)pyrene, and benzo(b)fluoranthene (Table 3).

These COPCs are present at higher concentrations at the center of the site, within the risk footprint (Figure 5). Concentrations of COPCs in the remaining soil and sediment would be within EPA target levels considered protective of human health if remediation were conducted to remove elevated concentrations of inorganic compounds within the risk footprint (Table 4). Potential exposures to COPCs found outside the risk footprint would not be expected to result in adverse health effects (Tetra Tech 2002). After soil and sediment are remediated within the risk footprint, the only COPCs that would remain at concentrations above EPA Region 9 residential PRGs would be arsenic and iron.

A risk footprint was devised in the RI report, which includes sample locations where risk to human health exists and follows the 400 mg/kg isopleth for lead (Figure 5). Sampling locations and chemical data were evaluated as they relate to the cleanup goals to identify an area of remediation. This evaluation is discussed in Section 4.0.

2.4.2 Summary of Ecological Risk Evaluation

Five assessment endpoints, ranging from plants to higher trophic-level receptors, were identified for specific evaluation in the BERA. Assessment endpoints include the following:

- Maintenance and protection of wetland and upland transitional plants
- Protection of populations of benthic invertebrates
- Protection of populations of waterfowl (mallard)

- Protection of populations of shorebirds (black-necked stilt)
- Protection of individual SMHM

Chemicals of ecological concern (COEC) for Site 30 were identified separately for plants, invertebrates, and birds and mammals. COECs were identified for plants and benthic invertebrates based on a comparison of the UCL_{95} concentration in soil compared with: (1) ambient values from site-specific sampling at the Tidal Area and from regional bay studies, and (2) toxicity-based benchmarks. COECs for birds and mammals were identified based on a comparison of the UCL_{95} to Tidal Area ambient values.

Risks to each type of receptor from chemicals identified as COECs were then characterized using a weight-of-evidence approach to evaluate whether the site poses a significant risk to ecological receptors that warrants additional evaluation or a response action. One of the primary objectives of the BERA was to establish a risk footprint to help establish the boundary for remedial action.

Concentrations of arsenic, copper, selenium, and zinc may be available for uptake for plants at concentrations greater than are required for healthy growth based on a comparison to Oak Ridge National Laboratory (ORNL) benchmark for plants (Tetra Tech 2002). Bioaccumulation factors (BAFs) greater than 1 for the pickleweed provided another line of evidence for potential risk. A BAF greater than 1 indicates the potential for contaminant uptake.

The risk to benthic invertebrates was evaluated based on the following lines of evidence. COECs were identified based on a hazard quotient (HQ) approach. First, sampling locations where the mean effects range-median (ER-M) quotient was greater than 1.5 were identified. Then, COECs with HQs greater than 1 were identified across the nine sampling locations where mean ER-M quotients were greater than 1.5. Lastly, mean HQs (across the nine locations) were calculated for each COPEC that had yielded at least one HQ greater than 1. COECs identified using this process were copper, lead, selenium, and zinc.

In summary, COECs that pose a risk to one or more of the assessment endpoint receptors at Site 30 include arsenic, cadmium, copper, lead, mercury, selenium, and zinc. Copper and zinc are COECs to all receptors, while mercury is a COEC only to aquatic birds and the SMHM. Lead is a COEC to all receptors except plants. Cadmium is a COEC only to aquatic birds.

Concentrations of some inorganic COECs at the site are high, based on comparison with ambient levels and with available screening values (Tables 3 and 4). The current level of inorganic chemical contamination at the site poses probable risk to plant, invertebrate, and bird and mammal receptors. In addition, the risk to the SMHM, a threatened and endangered species, is significant. Areas with the highest levels of contamination by inorganic chemicals are located where the debris is most concentrated, which is along the shoreline and in the center of the site. Removal of the debris would significantly reduce risk to both aquatic and wetland receptors.

The risk footprint developed (Figure 5) shows the overlap of risk to each receptor by location to identify areas of highest risk and to help establish the boundary for remedial action. A proposed footprint for excavation based on the risk footprint is discussed in Section 4.0.

3.0 IDENTIFICATION OF REMOVAL ACTION OBJECTIVES

This section discusses: (1) the statutory framework, (2) the determination of the scope of the removal, (3) the determination of removal schedule, (4) the applicable or relevant and appropriate requirements (ARAR), and (5) the RAOs for the removal action planned at Site 30.

3.1 STATUTORY FRAMEWORK

This removal action is being taken pursuant to CERCLA and the NCP, under the delegated authority of the Office of the President of the United States, by Executive Order (EO) 12580. This EO authorizes the Navy to conduct removal actions. The removal action is non-time critical because no immediate risk exists to human health. The public comment period for this EE/CA will provide the opportunity for public input to the cleanup process.

The Navy is the lead agency for the removal action. As the lead agency, the Navy has the authority to select the removal action methodology, while considering public and regulatory participation. The Naval Facilities Engineering Command, Southwest Division, is the regional manager of the Navy's CERCLA program.

This EE/CA complies with the requirements of CERCLA and the Superfund Amendments and Reauthorization Act of 1986; the NCP at 40 CFR Part 300; the Defense Environmental Restoration Program at Title 10 of U.S.C, Section 2701 et seq.; and EO 12580. This EE/CA is being prepared under 40 CFR Part 300.415(b)(2). In addition, the Navy will conduct the removal action in compliance with CERCLA.

Chemical- and solid-waste contaminated soil at Site 30 potentially contains lead, polynuclear aromatic hydrocarbons (PAH), metals, and debris (solid waste). Lead, metals, and PAHs were detected at levels that exceed site-specific cleanup criteria within the known risk footprint at Site 30. The debris found in the various test pits throughout Site 30 consisted of glass, metal, and wood.

The proposed removal action is intended to reduce the threat of human and various ecological receptors exposure to chemical- and solid-waste-contaminated soil at Site 30.

The proposed removal action will address the threats posed by the following conditions at Site 30, pursuant to the NCP:

Actual or potential exposure of nearby human populations to hazardous substances, pollutants, or contaminants (40 CFR Part 300.415(b)(2)(i). People residing or working at the site may be exposed through excavation, erosion, or other intrusive activities to soil contaminated with lead, metals, and PAHs through direct contact or incidental ingestion. Lead and PAHs are hazardous substances known to pose a threat to human health.

High levels of hazardous substances, pollutants, or contaminants in soil largely at or near the surface that may migrate (40 CFR Part 300.415(b)(2)(iv). Lead, metals and PAH at concentrations that exceed residential PRGs and site-specific action levels (EPA 1999) are present in soil at and near the surface of the site. This lead and PAH contamination may adversely affect public health and welfare if it is not removed or isolated.

3.2 DETERMINATION OF REMOVAL SCOPE

The removal action is intended to restrict the pathway for human exposure to hazardous substances in soil at Site 30. The RI process identified a risk footprint based on the screening-level HHRA and BERA that encompasses the risk to both human and ecological receptors. Removal of soil with elevated concentrations of inorganic compounds and the debris will significantly reduce the risk to both aquatic and wetland receptors and will be protective of human health. Confirmation samples will be collected to confirm that the goals of the removal action have been achieved. This action is intended to serve as the final remedial action for residential human health and ecological risks associated with the known contamination within Site 30.

3.3 DETERMINATION OF REMOVAL SCHEDULE

This EE/CA identifies and evaluates removal alternatives for Site 30. This EE/CA will be available for public review and comment for 30 days. The Navy will review the comments and, where appropriate, incorporate responses to public and regulatory agency comments into the action memorandum.

It is anticipated that the removal action will require 2 to 4 months, including mobilization and demobilization. Reestablishment of the pickleweed habitat could take 1 to 3 years.

3.4 APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS

The NCP states, “Removal actions . . . shall to the extent practicable considering the exigencies of the situation, attain applicable or relevant and appropriate requirements under Federal environmental or state environmental or facility citing laws” (40 CFR Part 300.415[i]).

An evaluation of ARARs for this EE/CA can be found in Appendix A. The following sections provide an overview of the ARARs process and a summary of the ARARs that potentially affect RAOs and alternatives.

3.4.1 Applicable or Relevant and Appropriate Requirements Overview

The identification of ARARs is a site-specific determination and involves a two-part analysis. First, a determination is made about whether a given requirement is applicable. Second, if it is not applicable, a determination is made about whether it is relevant and appropriate. A requirement is deemed applicable if the specific terms of the law or regulation directly address the chemicals of concern (COC), remedial action, or place involved at the site. If the jurisdictional prerequisites of the law or regulation are not met, a legal requirement may nonetheless be relevant and appropriate if the site's circumstances are sufficiently similar to circumstances in which the law otherwise applies and it is well suited to site conditions.

A requirement must be substantive to constitute an ARAR for activities conducted on site. Procedural or administrative requirements, such as permits and reporting, are not ARARs.

As the lead federal agency, the Navy has the primary responsibility for identification of federal ARARs at Site 30. As the lead state agency, DTSC has the responsibility for identifying state ARARs. For a state requirement to qualify as an ARAR, it must be: (1) a state law, (2) promulgated, (3) substantive, (4) from an environmental or facility siting law, (5) more stringent than the federal requirement, (6) identified in a timely manner, and (7) consistently applied. ARARs and to-be-considered (TBC) criteria are generally divided into three categories: chemical-, location-, and action-specific. TBC means that an environmental standard, requirement, criteria, or limitation is not legally applicable or relevant and appropriate, but is nevertheless useful information "TBC" in developing remedial alternatives. ARARs and TBCs affecting RAOs and alternatives are discussed in the following section.

3.4.2 Applicable or Relevant and Appropriate Requirements and To Be Considered Criteria Affecting Removal Action Objectives and Alternatives

3.4.2.1 Chemical-Specific ARARs

Chemical-specific ARARs are health- or risk-based numerical values or methodologies that, when applied to site-specific conditions, result in establishment of numerical cleanup values. These values establish the acceptable amount or concentration of a chemical found in, or discharged to, the ambient environment that is protective of human health or ecological receptors. The only potential chemical-specific ARARs are the requirements applicable to identification and land disposal of hazardous waste. If the removal action generates contaminated media that meets the definition of a Resource Conservation and Recovery Act (RCRA) hazardous waste, then the substantive provisions of the following RCRA requirements are potential ARARs California Code of Regulations, Title 22, Section (§) 66261.21:

- California Code of Regulations, Title 22, § 66261.22(a)(1)
- California Code of Regulations, Title 22, § 66261.23

- California Code of Regulations, Title 22, § 66261.24(a)(1)
- California Code of Regulations, Title 22, § 66261.100

RCRA land disposal restrictions at Title 22 of the California Code of Regulations (CCR) 66268.1(f) are also potential ARARs for discharging waste to land.

The Navy identified potential chemical-specific TBCs for lead for human receptors. The EPA Region 9 risk-based PRG for lead in residential soil, 400 mg/kg (EPA 1999), has been accepted by the Navy and DTSC as the cleanup goal for lead for prior removal actions at the TBB Disposal Site.

3.2.4.2 Location-Specific ARARs

Location-specific ARARs are restrictions on concentrations of hazardous substances or the conduct of activities as a result of the characteristics of the site or its immediate environment. The following location-specific ARARs were identified for Site 30:

- Coastal Zone Management Act (Title 16 USC 1456[c] and its implementing regulation, 15 CFR 930) (requires that activities near a coastal zone be conducted in a manner consistent with approved state management programs).
- The Endangered Species Act (Title 16 USC 1531 through 1543) (requires that federal agencies not jeopardize the continued existence of a listed species of cause the destruction or adverse modification of critical habitat).
- 40 CFR § 6.302(a), implementing Executive Order 11990 (provides that actions must be taken to minimize the destruction, loss or degradation of wetlands).
- Clean Water Act (33 USC § 1344) Section 404 (prohibits discharge of dredged or fill material into a wetland without a permit).
- 40 CFR § 6.302(b) implementing Executive Order 11988 (provides that actions must be taken to minimize potential harm in floodplains).
- The California Department of Fish and Game (CDFG) provided a list of ARARs for Site 30 in a letter dated August 3, 2004. The Navy has concluded that of the requirements provided by CDFG, the following requirements are ARARs:
    - California Fish and Game Code § 5650(a), (b) & (f): This section prohibits depositing or placing where it can pass into waters of the state any petroleum products, factory refuse, sawdust, shavings, slabs or edgings and any substance deleterious to fish, plant life or bird life.
    - California Fish and Game Code § 3005: This section prohibits the taking of birds and mammals, including taking by poison.

- California Fish and Game Code § 2080: This section prohibits the take of any endangered or threatened species.

- California Fish and Game Commission Wetlands Policy: This policy seeks to provide for the protection, preservation, restoration, enhancement and expansion of wetland habitat in California.

- California Fish and Game Code § 4700: This section prohibits the take or possession of listed fully protected mammals or their parts.

- California Fish and Game Code § 3503: This section prohibits the take, possession, or needless destruction of the nest or eggs of any bird except as otherwise provided.

- California Fish and Game Code § 3800: This section prohibits the take of nongame birds except in accordance with the regulations of the commission.

- California Fish and Game Code § 8500: This section provides that it unlawful to possess or take, unless otherwise expressly permitted, mollusks, crustaceans, or other invertebrates unless a valid tidal invertebrate permit has been issued.

CDFG also identified the following requirements, which the Navy has determined are neither applicable nor relevant and appropriate to Site 30:

- California Fish and Game Code § 1908: This section prohibits the taking of rare or endangered native plants.

- California Fish and Game Code § 3511: This section provides that it is unlawful to take or possess listed fully protected birds.

- California Fish and Game Code § 5050: This section prohibits the take or possession of fully protected reptiles and amphibians.

- California Fish and Game Code § 3503.5: This section prohibits the take, possession, or destruction of any birds in the orders of *Falconiformes* or *Strigiformes* (birds of prey) or to take, possess or destroy the nests or eggs of such birds.

- California Fish and Game Code § 4000: This section provides that a fur-bearing mammal may be taken only with a trap, a firearm, bow and arrow, poison under a proper permit, or with the use of dogs.

- California Fish and Game Code § 4150: This section provides that nongame mammals may not be taken or possessed except as otherwise provided.

- California Code of Regulations, Title 14 § 472: This regulation provides that nongame birds and mammals may not be taken except as provided in this section.

- California Code of Regulations, Title 14, section 40: This regulation makes it unlawful to capture, collect, intentionally kill or injure, possess, purchase, propagate, sell, transport, import, or export any native reptile or amphibian, or parts thereof unless a permit has been issued.

- California Code of Regulations, Title 14, section 460: This regulation makes it unlawful to take fisher, marten, river otter, desert kit fox, and red fox.

- California Code of Regulations, Title 14, section 465: This regulation states that fur-bearing mammals may be taken only with a firearm, bow and arrow, or with the use of dogs or traps in accordance with Section 465.5 and Section 3003.1 of the Fish and Game Code.

3.2.4.3 Action-Specific ARARs

Action-specific ARARs are technology- or activity-based requirements or limitations on actions taken with respect to hazardous wastes. These requirements are triggered by the specific remedial activities selected and suggest how a selected removal alternative should be achieved. These action-specific requirements do not, in themselves, control the removal alternative; rather, they indicate how a selected alternative must be conducted. Therefore, action-specific ARARs are identified after an alternative has been selected because they depend on the action selected.

Excavation

RCRA, the Federal Hazardous Materials Transpiration Law, the Clean Air Act and the Clean Water Act are potential ARARs for excavation.

Resource Conservation and Recovery Act

- California Code of Regulations, Title 22, §§ 66261.10 and 66261.11 (determination of hazardous waste).

- California Code of Regulations, Title 22, § 66268.1(f) (prohibit disposal of hazardous waste unless treatment standards are met).

- California Code of Regulations, Title 22, § 66262.34 (RCRA hazardous waste accumulation requirements).

- California Code of Regulations, Title 22, § 66262.30 (RCRA packaging requirements).

- California Code of Regulations, Title 22, § 66262.31 (RCRA labeling requirements).

- California Code of Regulations, Title 22, § 66262.32 (RCRA marking requirements).
- California Code of Regulations, Title 22, § 66262.33 (RCRA placarding requirements).
- California Code of Regulations, Title 22, §§ 66262.20, 66262.21, 66252.22 and 66262.23 (RCRA manifest requirements).

Federal Hazardous Materials Transportation Law

Potential ARARs for transporting of any hazardous waste:

- Federal Hazardous Materials Transportation Law, Title 49 USC 5101 through 5127, Title 49 CFR 171.2(f), 171.2(g), 172.300, 172.301, 172.302, 172.303, 172.304, 172.312, 172.400, and 172.504 (requirements for transporting hazardous wastes, including representations that containers are safe, prohibitions on altering labels, marking requirements, labeling requirements, and placarding requirements).

Clean Air Act

The following Bay Area Air Quality Management District (BAAQMD) regulations are potential ARARs for excavation:

- Regulation 6-302: Opacity Limitation (prohibiting emissions for a period aggregating more than 3 minutes in any hour to greater than or equal to 20 percent opacity).
- Regulation 6-305: Visible Particles (prohibiting the emissions of particles in sufficient number to cause annoyance).

Clean Water Act

State Water Resources Control Board (SWRCB) Order 99-08 is the State of California General Permit for Discharge of Stormwater Associated with Construction Activities, issued pursuant to 40 CFR 122 Subpart C. The substantive permit requirements are the use of best management practices to prevent construction pollutants from contacting storm water and to keep erosions products from moving off site. During excavation, best management practices will be used to prevent construction pollutants from contacting storm water and to minimize erosional products from moving off site in accordance with SWRCB Order 99-08.

Confirmation Sampling

There are no ARARs for the confirmation sampling planned as part of the alternatives.

On-Site Disposal

There are no ARARs for on-site disposal other than the RCRA land disposal restrictions described above and in the chemical-specific discussion.

Land Use Controls

There are no federal ARARs for institutional controls.

State statutes and regulations that the Navy has accepted as ARARs for implementing institutional controls and entering into an Environmental Restriction Covenant and Agreement with DTSC include substantive provisions of the following:

- California Civil Code § 1471 (provides conditions under which land use restrictions will apply to successive owners of land).
- California Health & Safety Code § 25202.5 (allows DTSC to enter into an agreement with the owner of a hazardous waste facility to restrict present and future land uses).
- California Health & Safety Code § 25222.1 (provides a streamlined process to be used to enter into an agreement to restrict specific use of property in order to implement the substantive use restrictions of California Health & Safety Code § 25232(b)(1)(A)–(E)).
- California Health & Safety Code § 25233(c) (provides a process for obtaining a written variance from a land use restriction).
- California Health & Safety Code § 25234 (sets forth the following "relevant and appropriate" substantive criteria for the removal of a land-use restriction on the grounds that "…the waste no longer creates a significant existing or potential hazard to present or future public health or safety").
- California Code of Regulations, Title § 67391.1 (provides that the DTSC shall not approve or concur in a response action decision document that includes land use controls [LUCs] unless the controls are clearly set forth and defined in the decision document).

Habitat Restoration

There are no action-specific ARARs for habitat restoration. Habitat will be restored in accordance with the location-specific ARARs identified above.

3.4 REMOVAL ACTION OBJECTIVES

RAOs are site-specific qualitative or quantitative goals that define the extent of cleanup required for a removal action. Based on CERCLA and the NCP, RAOs are as follows:

- Promote overall protection of human health and the environment.
- Restrict the potential for humans and other ecological receptors to contact chemical- or solid-waste-contaminated soil near the ground surface within Site 30.

The following criteria are considered action levels for excavation of common areas within known solid waste disposal areas in this EE/CA for Site 30:

- Lead – The maximum concentration of lead outside of the risk footprint (268 mg/kg) for which risk was not indicated to either ecological or human receptors will be used as the action level within the footprint for risk and debris.
- PAHs – the concentration in soil at the benzo(a)pyrene-equivalent concentration of 0.62 mg/kg (the site-specific criterion)
- Solid-waste-contaminated soil – visual observations will be used to verify that solid-waste-contaminated soil is fully removed both vertically and laterally.

4.0 IDENTIFICATION AND ANALYSIS OF REMOVAL ACTION ALTERNATIVES

Based on the objectives presented in Section 3.4, three alternatives have been developed for the removal action at Site 30. The three alternatives are described in the following sections and are evaluated based on their effectiveness, implementability, and cost. Each alternative is evaluated against five criteria to evaluate effectiveness (40 CFR Part 300.430): (1) overall protection of human health and the environment; (2) compliance with ARARs; (3) long-term effectiveness and permanence; (4) reduction of toxicity, mobility, or volume through treatment; and (5) short-term effectiveness.

Evaluation of the implementability for each alternative considers: (1) technical feasibility, (2) administrative feasibility, and (3) commercial availability of the remedy. Public and regulatory (Cal/EPA) acceptance will be evaluated in an action memorandum after the public comment period.

Costs for each removal action, including direct and indirect costs, were estimated using the Remedial Action Cost Engineering and Requirements (RACER) 2004 cost estimating software (Earth Tech 2004). The cost estimate was based on estimates for direct capital costs and indirect costs (markups). Annual operations and maintenance (O&M) costs for a 30-year period were included for each of the alternatives. Direct capital costs include labor, equipment, material, and waste disposal. Indirect costs include construction management staff, office overhead, general and administration, home office expenses, design, administrative, insurance, contingency allowances, and profit.

A present worth value has been calculated for each alternative. The present worth analysis provides a single figure that represents the amount of money that, if invested in the base year and dispersed as needed, will cover all cost associated with the alternative. The present worth calculation normalizes alternatives where operating durations differ to facilitate comparisons. All "total project durations" start at the time capital equipment is delivered to the site. It is assumed that procurement and design for all alternatives will be similar, so this estimated 6- to 8-month period was not included in any of the alternative durations.

Three alternatives are presented in this section:

- Alternative 1: No action with monitoring
- Alternative 2: Excavation, confirmation sampling, on-site disposal, LUCs, and habitat restoration
- Alternative 3: Excavation, confirmation sampling, off-site disposal, and habitat restoration

When the remedial alternatives were developed, either containing the groundwater using a sheet pile wall or stabilizing the waste in place was considered. These two options were eliminated based on the following concerns:

1. The pickleweed habitat is extremely sensitive to changes in elevation. Simply containing the groundwater (by using a sheet pile wall around the waste source) will not meet the RAOs developed for the site. Instead, a 2- to 3-foot "cap" over the contaminated area will be required to prevent ecological receptors from contacting COPCs and COECs. This cap will raise the elevation of the area and drastically reduce the amount of habitat available to the SMHM, a federally endangered species.

2. An in situ stabilization effort will increase the volume by 20 to 25 percent, raising the elevation of the site. This change in elevation will drastically reduce the amount of habitat available to the SMHM.

Alternatives 2 and 3 include common components (mobilization and demobilization, excavation, confirmation sampling, restoration, and post-closure monitoring) that are discussed once before the specific alternatives. If portions of these components vary from alternative to alternative, the variance is discussed in the analysis of each alternative. Table 5 summarizes the remedial alternatives and their components.

4.1 MOBILIZATION/DEMOBILIZATION

The relatively isolated location of the TBB Disposal Site imposes some constraints on any access to the site, including mobilization and demobilization. The site is located between two major railroad rights-of-way, the Union Pacific and BNSF (Figure 2). The nearest at-grade crossing is located 3,200 feet east of Site 30. An existing, unimproved road runs from the grade crossing between the two sets of tracks up to within 600 feet of Site 30. The existing unimproved access road between the two sets of tracks will not be adequate for use as a haul road, so a suitable haul road must be constructed to the site. The Navy will need to consult with Union Pacific and BNSF on the temporary crossing of the rail lines and working within the rights-of-ways. It is assumed that the haul road will require at least one railroad crossing over BNSF tracks (Figure 6). Clearing and grubbing vegetation will be required for construction of the haul road. It is assumed that construction equipment could complete the clearing operation in less than 1 week.

Once the road is completed, equipment and trucks will access a 1-acre area immediately east of the Taylor Boulevard Bridge that will serve as a truck staging area. The staging area will contain a vehicle decontamination pad and a separate area for stockpiling wastes to be profiled.

Polyethylene liners will be installed in areas designated to store wet wastes, and the perimeter of the staging areas will be bermed or otherwise protected as necessary to prevent sediment-laden storm water runoff to areas beyond the project boundary. Storm water will be pumped to a temporary storage tank and disposed of appropriately. Dust suppression measures will be undertaken during the entire duration of the project.

The SMHM may exist on site before removal activities begin. It is anticipated that the Navy will consult with USFWS to help minimize the short- and long-term impacts on the SMHM. The cost estimate considers construction of a mouse-proof fence 5 feet outside the eastern extent of the excavation footprint. SMHM may be trapped and relocated outside the fence under the supervision of a biological monitor before removal activities begin. The mouse-proof fence will protect the endangered SMHM by keeping them out of the construction area and will serve as a visual boundary for excavation (Figure 7)

A temporary water-filled dam will be installed around the excavation footprint and the area will be dewatered to simplify the excavation and debris removal as well as to provide a barrier to further disturbance of adjoining wetlands. The proposed excavation footprint is presented in Figure 7. Low ground pressure (LGP) equipment or "crane mats" are proposed to minimize damage in areas where heavy equipment accesses the site. Debris, soils, and sediments will remain combined in stockpiled areas.

4.2 EXCAVATION

Debris was generally found to coincide with locations of ecological and human health risk, so the debris is likely the source of contamination (Tetra Tech 2002). The bulk of the contaminants that contain elevated levels of contaminants will be removed along with the debris. If elevated levels of debris and lead-contaminated soil are removed (confirmed by confirmation sampling), it can be demonstrated (Table 4) that elevated concentrations of other contaminants will also be removed from Site 30. The goals of the excavation effort are to remove all visible debris within the excavation footprint and meet the requirements for confirmation soil sampling laid out in Section 4.3.

The proposed footprint of the excavation is presented in Figure 7. This footprint was developed based on the risk footprint (Figure 5) developed during the RI. The proposed excavation footprint follows the footprint for risk and debris. The excavation footprint was developed using information in the RI report (Tetra Tech 2002). The depth of excavation, which is also shown on Figure 7, varies from 1 to 4 feet bgs. The depths of excavation were established by evaluating the depth of debris in the boring locations where there was ecological risk and evaluating chemical concentrations in locations of human health risk. Chemical concentrations above the human health cleanup goals (Table 3) occurred mainly from the ground surface to 0.5 feet bgs (Tetra Tech 2002). Soils and sediments in locations where deeper samples were collected (between 1.0 and 1.5 feet bgs) did not exhibit an unacceptable risk to human health.

A sampling grid will be developed before exaction starts (Figure 7) to guide confirmation sampling during the excavation. Visual screening will be used to guide excavation until all visible debris has been removed within the designated grid. A confirmation soil sample will then

be collected, as outlined in Section 4.3. If the requirements outlined in Section 4.3 are met, then that portion of the excavation is considered complete. If those requirements are not met, then the area will be excavated an additional foot laterally or vertically, depending on the sample location. Another confirmation sample will be collected and the process will be repeated until the cleanup level of 268 mg/kg is reached.

Excavation can proceed down to the groundwater table, or deeper if solid wastes are visually identified. The excavation will be dewatered if groundwater is encountered. Dewatering will be limited to situations that require unobstructed dry access to the bottom of the excavation. Water will be pumped to a temporary storage tank, where samples will be collected for analytical testing of metals, PAHs, pesticides and PCBs and disposed of appropriately.

Assuming a bulking factor of 30 percent, between 2,500 cubic yards (yd^3) (following the depths of the risk footprint) and 4,400 yd^3 (assuming a 3-foot uniform excavation depth) of debris and soil is anticipated to be excavated from the site. It is assumed that an LGP excavator and a front-end loader could complete the excavation in about 1 month. Personnel will excavate the site in Level D personal protective equipment

4.3 CONFIRMATION SAMPLING PROGRAM

Confirmation soil samples will be collected during the excavation procedure from the limits of excavation and will be analyzed for lead to document any residual contamination at Site 30. Lead is the primary inorganic chemical of concern. Other COPC and COECs appear to be collocated with the lead contamination (Table 4). Based on the results from previous sampling, it is apparent that removing the lead contaminated soil will also remove the elevated concentrations of all other COPCs and COECs. The confirmation samples will be collected from the bottom (26 samples, 35 feet center to center) and sidewalls (24 samples, 35 feet center to center) of the excavation and will be analyzed for lead (Figure 7). A 3-day turnaround time is assumed for analysis of lead. Analytical results will be compared with the 268 mg/kg cleanup level for lead (Tables 3 and 4). The analytical results will be used to evaluate the status of the removal effort, as described above.

This cost estimate assumed that 50 confirmation samples will be collected from the walls and base of the excavation and analyzed for lead (Figure 7). Quality assurance and quality control (QA/QC) samples will be also collected.

4.4 SITE RECONSTRUCTION WITH IMPORTED FILL AND HABITAT RESTORATION

Once confirmation sampling results indicate that excavation is are complete, Site 30 will be reconstructed by backfilling the excavation with imported fill material that is suitable for re-establishing aquatic habitat and enhancing the wetland and upland habitats. The source and availability of suitable import material meeting RWQCB criteria for wetland cover soils has not yet been identified.

Excavated areas will be backfilled and graded to re-establish the existing contours and elevations in the pickleweed zone. The final site grade will be designed to encourage growth of pickleweed in the areas east of and adjacent to the existing zone. Farther east of the new pickleweed area, the site will be graded to match the existing upland contours and elevations. Figure 8 presents a conceptual grading plan, and Figure 9 presents a cross-section that shows the proposed limits of excavation and site reconstruction.

Backfill will be soil that is compatible with the wetland that is imported from either an on-site borrow pit or an off-site source. Based on the specification for wetland compatible soils developed for the landfill at site 1, Naval Weapons Station Seal Beach Detachment Concord (NWS SBD Concord) in Concord, the source will meet the following requirements:

- pH = 5.0 to 8.0
- Cation exchange capacity = > 15 milliequivalent per 100 grams
- Organic matter = >5 percent
- Ca, Mg, Na = Sodium Adsorption Ratio (SAR) <12
- Potassium (K) = > 200 parts per million (ppm)
- Percent base saturation greater than 50 percent
- Kjeldahl nitrogen (total nitrogen) = 2 percent (20,000 ppm)
- Nitrate-nitrogen = 50 to 100 ppm

The material will be tested to confirm that it is suitable. The final lift will overfill above design grade and will be compacted to 80 percent proctor density. Erosion control and re-vegetation procedures will be developed to facilitate seedling growth and reestablishment of vegetation.

The vegetation will be restored using existing pickleweed plants, along with plants from an off-site nursery. Existing plants, to the extent possible, will be removed and stored during excavation and will be reused during restoration.

4.5 ALTERNATIVE 1 – NO ACTION WITH MONITORING

Under Alternative 1, no remedial action will be taken. Contaminated soil, sediments, and debris will be left at Site 30 "as is." The no action response is retained throughout the EE/CA process as required by the NCP (40 CFR 300.430[e][6]) to provide a comparative baseline used to evaluate other alternatives. Under this alternative, annual monitoring will be instituted to evaluate the health of plant and animal populations. A field survey of the plant population will be conducted annually by a qualified biologist. Groundwater samples will be collected yearly to analyze for metals and PAHs to evaluate potential migration of COPCs and COECs off site. Table 5 summarizes the remedial alternatives and their components.

4.5.1 Effectiveness

This alternative is evaluated for the five effectiveness criteria in the following paragraphs

4.5.1.1 Overall Protection of Human Health and the Environment

The no action alternative is not protective of human health or the environment under the unrestricted (or residential) use scenario because this alternative does nothing to prevent unrestricted use or address contaminants in soil, sediments, and debris that could pose a potential risk to human and ecological health. Contaminated soil, sediments, and debris will be left as is. Monitoring will serve only to evaluate migration of contaminants off site and to indicate whether contaminants at Site 30 are bioaccumulating within the ecological receptors. Therefore, this alternative will not eliminate, reduce, or control the potential human health and ecological risk presented by contaminated soil and sediments at Site 30.

The alternative is also not protective of ecological receptors because it does nothing to prevent direct or indirect contact of ecological receptors with the identified COECs.

4.5.1.2 Compliance with ARARs/TBC Guidance

This alternative does not comply with ARARs.

4.5.1.3 Long-Term Effectiveness and Permanence

The factors evaluated under long-term effectiveness and permanence include the magnitude of residual risk and the adequacy and reliability of controls. Risks to human health and ecological receptors will be unacceptable because of the presence of COPCs and COECs in the soils, sediments, and debris. Thus, Alternative 1 does not assure long-term effectiveness and permanence.

4.5.1.4 Reduction of Toxicity, Mobility, or Volume through Treatment

The mobility, toxicity, and volume of hazardous substances at Site 30 will not be reduced under Alternative 1 because the contaminated soil, sediments, and debris will not be removed or treated.

4.5.1.5 Short-Term Effectiveness

The factors considered when assessing the short-term effectiveness of an alternative are protection of the community and workers during remedial actions, environmental impacts that would result from construction and implementation of the alternative, and the time required to complete remedial action. Each of these factors is assessed below for Alternative 1.

This alternative does nothing to address the unacceptable health risks to the community and current occupants because no remedial action will be taken. No adverse environmental impacts will result from construction and implementation of this alternative because no remedial action will be taken. This alternative does not require any time for remedial action because no remedial action will be conducted.

Alternative 1 will not achieve the RAO for soils under the unrestricted land use scenario or the ecological RAOs. The no action alternative is therefore considered not effective in the short term.

4.5.2 Implementability

Implementability includes the technical and administrative feasibility and availability of required resources. No construction or administrative activities will be required to implement this alternative. A qualified biologist or environmental scientist will be monitoring the site (including plant and animal surveys, tissue collection and groundwater sampling) on an annual basis. Therefore, the alternative is technically feasible. This alternative is easily implemented.

4.5.3 Cost

Total estimated cost to complete this alternative is $330,000. The detailed cost estimate associated with this alternative is presented in Appendix B. This cost estimate includes costs for annual surveying of plants and animals by a qualified biologist, analytical costs for groundwater samples, and annual monitoring reports to summarize the findings over a 30 year period.

4.6 ALTERNATIVE 2 – EXCAVATION, ON-SITE DISPOSAL (STABILIZATION), HABITAT RESTORATION, LUCS

Alternative 2 consists of excavating between 2,500 and 4,400 yd^3 of debris and soils that contain contaminants at concentrations that pose a risk to human and ecological health. The depth and footprint of the excavation were delineated as part of the alternative development process (Figure 7). Excavated material will be stabilized and disposed of in an on-site soil cell adjacent to Site 30 (Figure 10). Risks to human and ecological receptors from exposure to contaminated soils and sediments by direct and indirect contact will be eliminated under this alternative because all contaminated soil, sediments, and debris will be removed, stabilized, and contained. Table 5 summarizes the remedial alternatives and their components.

Administrative actions (permits and institutional controls) will be required for construction of an on-site disposal cell.

The major components of this alternative are as follows:

- Mobilization and demobilization of earth-moving equipment.
- Installation of species control systems and trapping as necessary.
- Installation of water control systems and dewatering as necessary.

- Mechanical excavation of contaminated soil, sediments, and debris according to the proposed excavation footprint identified, and confirmation sampling.
- Stabilization of excavated waste.
- On-site containment of stabilized waste.
- Reconstruction of the excavated areas with imported material that is suitable for an aquatic habitat and growth of pickleweed.

The mobilization and demobilization, excavation, confirmation sampling and habitat restoration processes are as described in Sections 4.1 through 4.3.

Solidification/stabilization (S/S) is a physical and chemical treatment process that reduces mobility either by chemically altering or binding the contaminant (stabilization) or by reducing contaminant contact with a mobilizing medium by enclosing it within a stabilized mass (solidification). Inorganic and organic reagents are mixed with the target media to achieve S/S. Example reagents include lime, fly ash, Portland cement, bitumen, polyethylene, and reactive monomers.

Stabilization is considered a treatment technology and is effective for metals. The metals ions will be chemically tied up in a pozzolanic matrix, and the final material will no longer be characteristically hazardous.

Before excavation and stabilization can begin, bench-scale tests will be needed on the debris and sediment to establish the required reagents and mixing ratios for the S/S process. Based on the results from the RI (Tetra Tech 2002) it is assumed that Site 30 material is a good candidate for the solidification/stabilization process. Pilot studies may be required to establish the most effective mixing technology, however.

A soil disposal cell will be constructed in a location adjacent to and east of the disposal site. The soil disposal cell will be constructed by excavating an area of approximately 13,000 square feet (10 feet deep), which will be able to hold a volume of approximately 4,800 cubic yards. This sizing assumes an increase in volume of 25 percent during stabilization and using a scenario of excavating 3,500 yd^3 of contaminated soil and debris. The excavated soil will be temporarily stockpiled for later reuse. This soil will be characterized for suitability as restoration material for the excavated wetland. The suggested analytical suite includes metals, semivolatile organic compounds (SVOCs), total organic carbon (TOC), and particle seize distribution. The top 2 feet will be used as cover for the soil disposal cell, and the deeper soils will be used to restore Site 30, provided it meets the soil suitability requirements for wetland backfill. The soil disposal cell will be constructed in accordance with the action-specific ARARs established for this alternative.

Prohibitions on land use will be initiated and maintained.

4.6.1 Effectiveness

This alternative is evaluated for the five effectiveness criteria in the following paragraphs

4.6.1.1 Overall Protection of Human Health and the Environment

The RAO for unrestricted land use is concerned primarily with preventing exposure to contaminated soil. Alternative 2 is protective of human health by reducing the exposure of COPCs through removal and containment of soils and sediments and debris. Land-use restrictions will be required for the on-site disposal cell.

RAOs for ecological receptors are concerned with source control and preventing exposure to metals in contaminated soil, pore water, and food. Alternative 2 is protective of ecological receptors by removing source material (debris) and reducing exposure of ecological receptors to COECs in the most biologically active soil layer (0 to 3 feet bgs), reducing its toxicity and mobility and containing it in an engineered containment system. On-site disposal will be designed such that no new exposure pathways to disposed material are created. Protection of the four ecological receptor categories will accomplish protection of the biota in all three habitats at the site because these receptors constitute appropriate surrogates for communities and trophic levels in habitats at Site 30.

4.6.1.2 Compliance with ARARs/TBC Guidance – Alternative 2

Alternative 2 can be designed to meet all chemical-, location-, and action-specific ARARs, which are summarized in Section 3.4 and in Tables A-1, A-2, and A-3 in Appendix A. The excavation and disposal could trigger a variety of hazardous waste requirements under RCRA. Since there is a reasonable expectation that the excavated soil would be hazardous, analysis of the excavated soil is recommended unless sufficient data are obtained during pre-excavation sampling for analysis by toxicity characteristic leaching procedure (TCLP). Sampling must comply with the hazardous waste identification regulations in 22 CCR, Division 4.5, Chapter 11 and 14, to determine whether soil exhibits state or federal hazardous waste characteristics. Alternative 2 will comply with the RCRA hazardous waste classification and determination requirements.

If the soil qualifies as a hazardous waste, it would be managed, stored, and transported in accordance with the substantive federal requirements in 49 CFR §§ 171.2(f), 171.2(g), 172.300, 172.301,172.302, 172.303172.304, 172.312, 172.400, and 172.504, as well as the RCRA requirements in 22 CCR, Sections 66262.20 through 66262.23 and Sections 66262.30 through 66262.34 (Table 2-5). If the federal requirements have been revised, disposal of soils will be governed by the most recent federal requirements.

As appropriate, excavated soil would be handled and treated to comply with the land disposal restrictions (LDRs) of 22 CCR 66268.7. In addition, the soil would be characterized according to CCR Title 27 requirements for solid and designated waste if it is not hazardous waste. If the waste is hazardous, it may be moved or treated with the area of concern (AOC). Placement does not occur when restricted hazardous wastes are moved or treated within an AOC, which is essentially a discrete zone of continuous contamination. Once stabilized, the waste should no longer be hazardous.

Furthermore, the substantive requirements in BAAQMD Regulation 6 are considered applicable to Alternative 2. Specifically, Regulations 6-302, and 6-305 that contain standards for particulates and visible emissions would be applicable to limit dust and particulate emissions during excavation and removal. Dust control will likely include judicious use of water, use of palliatives, properly covering stockpiled soils, modifying operations, or other engineering means acceptable to the Navy and regulatory agencies.

Alternative 2 will also comply with the applicable storm water discharge requirements of SWRCB Order 99-08 adopted pursuant to 40 CFR Part 122, Subpart C.

Alternative 2 will comply with all location-specific ARARs, including the Coastal Zone Management Act and the Federal Endangered Species Act. Excavation and removal of affected soils will eliminate potential exposure pathways for both human and ecological receptors.

The SMHM is a federally listed endangered species that could occur at the TBB Disposal Site. Activities at the site under Alternative 2 could therefore result in "take" as defined under the Endangered Species Act. Take is prohibited unless a permit pursuant to the statute has been issued to the party involved. The SMHM will be presumed to be present at the site. The Navy must consult the USFWS to mitigate any potential for take of the species and to assess the need for an incidental take permit.

Restoration of the excavated area proposed under Alternative 2 will involve excavation from and filling in a wetland. Based on a review of the information in the RI, this EE/CA concludes that Site 30 is potentially a jurisdictional wetland as defined under the Clean Water Act. The Navy will comply with the substantive requirements of the nationwide permit and 40 CFR § 230.10 and EO 11990 (protection of wetlands). The Navy will also comply with EO 11988 (floodplain management). In addition, Alternative 2 will comply with the following state location-specific ARARs:

- California Fish and Game Code §§ 5650(a), (b) & (f); 3005; 1908; 2080; 3511; 4700, 5050, 3503; 3503.5; 3800; 4000; 4150; and 8500.

- California Fish and Game Commission Wetlands Policy: This policy seeks to provide for the protection, preservation, restoration, enhancement, and expansion of wetland habitat in California.

- California Code of Regulations, Title 14 §§ 472; 40; 460; and 465.

Alternative 2 will also comply with state requirement for land use controls including:

- California Civil Code § 1471.
- California Code of Regulations, Title 22 § 67391.1.
- California Health & Safety Code § 25202.5.

- California Health & Safety Code § 25222.1.
- California Health & Safety Code § 25233(c).

4.6.1.3 Long-Term Effectiveness and Permanence

The factors evaluated under long-term effectiveness and permanence include (1) the magnitude of residual risk, and (2) the adequacy and reliability of controls. Each of these factors is assessed below for Alternative 2.

Magnitude of Residual Risks

Residual risks may be permanently reduced to within acceptable levels that are protective of human health and the environment by removing all affected soils and sediments that contain contaminants at concentrations that exceed the cleanup criteria for Lead,, and by removing all debris within Site 30. Stabilization will reduce the mobility and toxicity of the waste. Institutional controls will be imposed to control access to the on-site disposal area, and applicable standards and guidelines will be met in the short run.

Adequacy and Reliability of Controls

There is a low potential for the on-site disposal facility to cause adverse impacts to the environment. In addition, environmental conditions may affect long-term contaminant mobility. Furthermore, chemical stabilization processes may consume potentially large volumes of bulk reagents and additives. Finally, institutional controls may be required to limit development at the on-site soil disposal cell. Technology performance specifications, long-term management, monitoring, and O&M requirements may be required under this alternative to ensure the effectiveness of the remedy. Therefore, Alternative 2 is considered moderately to highly effective and reliable over the long term.

4.6.1.4 Reduction of Toxicity, Mobility, or Volume through Treatment

This evaluation criterion addresses the CERCLA preference for selecting remedial actions that employ treatment technologies that permanently and significantly reduce the mobility, toxicity, or volume of hazardous substances. Alternative 2 will not reduce the volume, but will reduce the toxicity and mobility, of hazardous substances at the site. Alternative 2 will have be moderately effective in satisfying this criterion since it effectively immobilizes and reduces the toxicity of the waste.

4.6.1.5 Short-Term Effectiveness

The factors considered when assessing the short-term effectiveness of an alternative are protection of the community and workers during remedial actions, environmental impacts that could result from construction and implementation of the alternative, and time required to complete remedial actions. Each of these factors is assessed in the following paragraphs for Alternative 2.

Protection of the Community

Access to the site is restricted from a distance of at least 2 to 3 miles from Site 30. The public is not likely to face any short-term risks during excavation and removal. However, measures will be taken during excavation, staging, loading, stabilization, and disposal of contaminated soil, sediments, and debris to reduce and control short-term risks.

Dust suppression measures will be used, as necessary, to reduce generation of fugitive dusts. A detailed air-monitoring plan will be developed that will establish specific boundaries for work areas and traffic routes. Strategic locations along these boundaries will be monitored for airborne emissions to ensure that health-protective levels are achieved in the short term throughout the remedial action.

Worker safety considerations associated with implementation of Alternative 2 can be grouped into two categories: (1) general site hazards, and (2) potential chemical hazards. General site hazards include the following:

- Heavy equipment hazards
- Occupational noise exposure
- Potential slip, trip, or fall hazards
- Potential for contact with overhead mechanical and electrical hazards or utility lines
- Airborne dust hazards

Exposure to general site hazards can be reduced by providing (1) appropriate safety equipment to minimize noise and dust exposure, and (2) awareness training to orient personnel with physical hazards at a site.

Potential chemical hazards include inhalation of, absorption of, ingestion of, and contact with hazardous substances in contaminated soil. On-site remedial workers will wear Level D protection during soil excavation. The specific protection worn will be dictated by the level of dermal and inhalation protection necessary. Air will be monitored to assist in setting the required level of protection. The level of protection may be upgraded if high contaminant concentrations are detected during excavation of soil, sediments, and debris at Site 30.

Environmental Impact

Excavation will result in short-term, temporary impacts to environment. Upland impacts will include vegetation affected by equipment traffic from the access point to the working area and within the staging area adjacent to the excavation. These impacts should be minimal and will be mitigated by using post-construction restorative efforts or by using LGP equipment as necessary. Additionally, crane mats may be used where soft ground conditions are present.

Temporary loss of non-mobile animals and a portion of the plants within the area enclosed by a temporary water-filled dam will occur as a result of dewatering during the project. Any affected biota is expected to recolonize the unexcavated area after the dam is removed. In addition, the temporary dam will minimize any impacts to Seal Creek Marsh.

Impacts from excavation will include removal of all non-mobile biota in the excavation area. The excavation area will be reconstructed and restored so that no permanent impacts will occur, however. Final contours in a portion of the upland transition area adjacent to the shore will be lowered to provide additional and enhance the habitat.

Air monitoring will ensure that dust control measures are effectively limiting environmental impacts. In addition, appropriate equipment decontamination procedures will be used to prevent transport of contaminated soil, sediments, and debris to uncontaminated areas of Site 30. The remedial action will be constructed in a manner to reduce potential impacts to biota in the adjacent areas.

Time Required for Remedial Action

Approximately 2 months will be required to complete all remedial activities associated with Alternative 2. The length of time required to excavate, stabilize, and dispose of stabilized debris and soils may be affected by the following factors:

- The time required to characterize samples of the contaminated soil,
- Additional volumes of debris encountered during excavation,
- The number of unanticipated obstructions during excavation
- Suitable weather conditions
- Access limitations imposed by the railroad to accommodate its operation

Based on the five criteria above, Alternative 2 is considered to have an overall moderate level of short-term effectiveness.

4.6.2 Implementability

The technical and administrative feasibility and availability of required resources to implement Alternative 2 are discussed below.

4.6.2.1 Technical Feasibility

Alternative 2 is considered to have a medium to high technical complexity, primarily because access to Site 30 is limited. Obtaining permission for construction near the railway easements, as well as mobilization of earth-moving equipment, will be the greatest challenges. The Navy must consult the BNSF and Union Pacific about potential crossing of the rail lines and working

within the rights-of-way. These constraints could delay the construction schedule unless planning acknowledges and accommodates the railroads' requirements.

This alternative will use standard construction methods. Some added regulatory constraints will be encountered because Site 30 is a wetland, however. After site reconstruction, annual monitoring for 1 to 3 years may be necessary to document that wetland habitat has been re-established.

4.6.2.2 Administrative Feasibility

The alternative is administratively feasible. However, coordination with multiple regulatory agencies will be necessary to comply with action-specific ARARs.

4.6.2.3 Availability of Required Resources

The on-site disposal capacity will be adequate to manage the relatively small volume of stabilized soils and sediments (approximately 4,400 yd^3) generated from Site 30. Resources required to complete associated remedial activities are available.

Overall, Alternative 2 is considered to be moderately implementable based on the technical and administrative challenges associated with this alternative.

4.6.3 Cost

The overall cost of this alternative is considered moderate to high because of capital costs associated soil excavation, stabilization, and on-site disposal. The cost of constructing an on-site soil disposal cell depends on the soil characterization. Capital costs for this alternative assume that (1) the existing unimproved road that runs between the existing railroad tracks can be improved for use as a haul route to Site 30; (2) a haul route to Site 30 is not located within a habitat for any threatened or endangered species; (3) there are no federal jurisdictional issues related to the haul route locations; and (4) there is no agreement in place between the Navy and regulatory agencies related to habitat issues. O&M costs associated with this alternative include annual monitoring for 1 to 3 years to document that wetland habitat is restored.

The total estimated cost to complete this alternative is $ 1.6 million. A detailed breakdown of the estimated costs is presented in Appendix B.

4.7 ALTERNATIVE 3 – EXCAVATION, CONFIRMATION SAMPLING, OFF-SITE DISPOSAL, AND SITE RESTORATION

Alternative 3 consists of excavating between 2,500 and 4,400 yd^3 of debris and soils that contain contaminants at concentrations that pose a risk to human and ecological health. The depth and footprint of the excavation were delineated as part of the alternative development process (Figure 7). Excavated soils will be disposed of off site (Figure 11). Risks to human and ecological receptors from exposure to contaminated soils and sediments by direct and indirect

contact will be eliminated under this alternative because all contaminated soil, sediments, and debris will be removed. Table 5 summarizes the remedial alternatives and their components.

The major components of this alternative are as follows:

- Mobilization and demobilization of earth-moving equipment.
- Installation of species control systems and trapping as necessary.
- Installation of water control systems and dewatering as necessary.
- Mechanical excavation of contaminated soil, sediments, and debris according to the proposed excavation footprint identified, and confirmation sampling.
- Off-site disposal of contaminated soil, sediments, and debris at appropriate landfill(s).
- Reconstruction of the excavated areas with imported material that is suitable for an aquatic habitat and pickleweed.

The mobilization and demobilization, excavation, confirmation sampling and habitat restoration processes are as described in Sections 4.1 through 4.3.

Excavated soil, sediments, and debris will be hauled to an appropriate off-site landfill via trucks. However, based on existing data for metals, it is likely that excavated material will be hauled to a Class I landfill. Therefore, this EE/CA assumed that 70 percent of the waste will be disposed of in a Class I facility and 30 percent in a Class II facility. Before a work plan for remedial activities is prepared, it is highly recommended that TCLP be analyzed by additional sampling to evaluate the waste disposal classification for the soil. The current analytical results are not adequate to identify the disposal facility or the land disposal treatment requirements.

4.7.1 Effectiveness

This alternative is evaluated for the five effectiveness criteria in the following paragraphs

4.7.1.1 Overall Protection of Human Health and the Environment

The RAO for unrestricted land use is concerned primarily with preventing exposure to contaminated soil. Alternative 3 is protective of human health by reducing the exposure to COPCs through removal of soils, sediments, and debris.

RAOs for ecological receptors are concerned with source control and preventing exposure to metals in contaminated soil, pore water, and food. Alternative 3 is protective of ecological receptors by removing source material (debris) and reducing the exposure of ecological receptors to COECs by removing contaminated soils and sediments in the most biologically active soil layer (0 to 3 feet bgs). Protection of the four ecological receptor categories will accomplish protection of the biota in all three habitats at the site because these receptors constitute appropriate surrogates for communities and trophic levels in habitats at Site 30.

4.7.1.2 Compliance with ARARs/TBC Guidance

Alternative 3 can be designed to meet all chemical-, location-, and action-specific ARARs, which are summarized in Section 3.4 and Tables A-1, A-2, and A-3 in Appendix A. The excavation and disposal could trigger a variety of hazardous waste requirements under RCRA. Since there is a reasonable expectation that the excavated soil would be hazardous, analysis of the excavated soil samples would be recommended unless sufficient data are obtained during pre-excavation TCLP sampling. Sampling must comply with hazardous waste identification regulations in 22 CCR, Division 4.5, Chapter 11 and 14, to assess whether the soil exhibits state or federal hazardous waste characteristics. Alternative 3 will comply with the RCRA hazardous waste classification and determination requirements.

If the soil qualifies as a hazardous waste, it would be managed, stored, and transported in accordance with the substantive federal requirements in 49 CFR §§ 171.2(f), 171.2(g), 172.300, 172.301,172.302, 172.303172.304, 172.312, 172.400, and 172.504, as well as the RCRA requirements in 22 CCR, Sections 66262.20 through 66262.23 and Sections 66262.30 through 66262.34 (Table 2-5). If the federal requirements have been revised, disposal of soils will be governed by the most recent federal requirements.

As appropriate, excavated soil would be handled and treated to comply with LDRs of 22 CCR 66268.7. In addition, if the soil is not hazardous waste, it would be characterized according to CCR Title 27 requirements for solid and designated waste to evaluate whether the material must be disposed of at a permitted Class II or Class III landfill.

Furthermore, the substantive requirements in BAAQMD Regulation 6 are considered applicable to Alternative 3. Specifically, Regulations 6-302, and 6-305 that contain standards for particulates and visible emissions would be applicable to limit dust and particulate emissions during excavation and removal. Dust control will likely include judicious use of water, use of palliatives, properly covering stockpiled soils, modifying operations, or other engineering means acceptable to the Navy and regulatory agencies.

Alternative 3 will also comply with the applicable storm water discharge requirements of SWRCB Order 99-08 adopted pursuant to 40 CFR Part 122, Subpart C.

Alternative 3 will comply with all location-specific ARARs, including the Coastal Zone Management Act and the Federal Endangered Species Act. Excavation and removal of affected soils will eliminate potential exposure pathways for both human and ecological receptors.

The SMHM is a federally listed endangered species that could occur at the TBB Disposal Site. Activities at the site under Alternative 3 could therefore result in take, as defined under the Endangered Species Act. Take is prohibited unless a permit pursuant to the statute has been issued to the party involved. The SMHM will be presumed to be present at site. The Navy must consult with the USFWS to mitigate any potential for take of the species and to assess the need for an incidental take permit.

Restoration of the excavated area proposed under Alternative 3 will involve excavation and filling in a wetland. Based on a review of the information in the RI, this EE/CA concludes that Site 30 is potentially a jurisdictional wetland as defined under the Clean Water Act. The Navy will therefore comply with the substantive requirements of the nationwide permit and 40 CFR § 230.10 and EO 11990 (protection of wetlands). The Navy will also comply with EO 11988 (floodplain management). In addition, Alternative 3 will comply with the following state location-specific ARARs:

- California Fish and Game Code §§ 5650(a), (b) & (f); 3005; 1908; 2080; 3511; 4700, 5050, 3503; 3503.5; 3800; 4000; 4150; and 8500.

- California Fish and Game Commission Wetlands Policy: This policy seeks to provide for the protection, preservation, restoration, enhancement, and expansion of wetland habitat in California.

- California Code of Regulations, Title 14 §§ 472; 40; 460; and 465.

4.7.1.3 Long-Term Effectiveness and Permanence

The factors evaluated under long-term effectiveness and permanence include (1) the magnitude of residual risk, and (2) the adequacy and reliability of controls. Each of these factors is assessed below for Alternative 3.

Magnitude of Residual Risks

Residual risks will be permanently reduced to within acceptable levels that are protective of human health and the environment by removing all affected soils and sediments that contain contaminants at concentrations that exceed the cleanup criteria for lead, and by removing all debris.

Adequacy and Reliability of Controls

Excavation with off-site disposal is a proven and reliable technology that will effectively remove contaminated soils from Site 30 and thus permanently reduce the possibility of human or ecological exposure to affected materials. Annual monitoring for 1 to 3 years may be required to document the successful revegetation of the wetland habitat at Site 30. Therefore, Alternative 3 is considered highly effective over the long term.

4.7.1.4 Reduction of Toxicity, Mobility, or Volume through Treatment

This evaluation criterion addresses the CERCLA preference for selecting remedial actions that employ treatment technologies that permanently and significantly reduce the mobility, toxicity, or volume of hazardous substances. Depending on TCLP results, treatment may be required before the material can be landfilled. If the material is treated, the CERCLA preference for treatment, as a principal element of the remedy, will be satisfied by Alternative 3. However, since the current analytical results are not adequate to identify the disposal facility or the land

disposal treatment requirements, costs assumed that no treatment will be required. Without treatment, however, Alternative 3 will not reduce the toxicity, mobility, or volume of hazardous substances at Site 30. Thus, overall excavation and disposal will have a low effectiveness at satisfying this criterion.

4.7.1.5 Short-Term Effectiveness

The factors considered in assessing the short-term effectiveness of an alternative are: protection of the community and workers during remedial actions, environmental impacts that could result from construction and implementation of the alternative, and time required to complete remedial actions. Each of these factors is assessed in the following paragraphs for Alternative 3.

Protection of the Community

Access to the site is restricted from a distance of at least 2 to 3 miles from Site 30. The public is not likely to face any short-term risks during excavation and removal. However, measures will be taken during excavation, staging, loading, stabilization, and disposal of contaminated soil, sediments, and debris to reduce and control short-term risks.

For example, dust suppression measures (that is, watering, covering waste-filled trucks) will be used, if necessary, to reduce generation of fugitive dusts, although excavated material is expected to be wet or moist. A detailed air monitoring plan will be developed that will establish specific boundaries for work areas and traffic routes. Strategic locations along these boundaries will be monitored for airborne emissions to ensure levels that are health-protective in the short term are achieved throughout remedial actions. The local community may also be faced with increased truck traffic during excavation and backfilling; however, the increased number of trucks is not expected to result in noticeable traffic or other impacts.

Worker safety considerations associated with implementation of Alternative 3 can be grouped into two categories: (1) general site hazards, and (2) potential chemical hazards. General site hazards include the following:

- Heavy equipment hazards
- Occupational noise exposure
- Potential slip, trip, or fall hazards
- Potential for contact with overhead mechanical and electrical hazards or utility lines
- Airborne dust hazards

Exposure to general site hazards can be reduced by providing (1) appropriate safety equipment to minimize noise and dust exposure, and (2) awareness training to orient personnel with physical hazards at a site.

Potential chemical hazards include inhalation of, absorption of, ingestion of, and contact with hazardous substances in contaminated soil. On-site remedial workers will wear Level D protection during excavation of soil. The specific protection worn will be dictated by the level of dermal and inhalation protection necessary. Air will be monitored to assist in setting the required level of protection. The level of protection may be upgraded if high contaminant concentrations are detected during excavation of soil, sediments, and debris at Site 30.

Environmental Impact

Excavation will result in short-term, temporary impacts to the environment. Upland impacts will include vegetation affected by equipment traffic from the access point to the working area and within the staging area adjacent to the excavation. These impacts should be minimal and will be mitigated by using post-construction restorative efforts or by using LGP equipment as necessary. Additionally, crane mats may be used where soft ground conditions are present.

Temporary loss of non-mobile animals and a portion of the plants within the area enclosed by a temporary water-filled dam will occur as a result of dewatering during the project. Any affected biota is expected to recolonize the unexcavated area after the dam is removed. In addition, the temporary dam will minimize any impacts to Seal Creek Marsh.

Impacts from excavation will include removal of all non-mobile biota in the excavation area. The excavation area will be reconstructed and restored so that no permanent impacts will occur. Final contours in a portion of the upland transition area adjacent to the shore will be lowered to promote pickleweed growth and enhance the habitat.

Air monitoring will assist in evaluating whether dust control measures are effective in limiting environmental impacts. In addition, appropriate equipment decontamination procedures will be used to prevent transport of contaminated soil, sediments, and debris to uncontaminated areas of Site 30. The remedy will be constructed in a manner to reduce potential impacts to biota in the adjacent areas.

Time Required for Remedial Action

Approximately 1 month will be required to complete all remedial activities associated with Alternative 3. The length of time required to excavate, remove, and dispose of contaminated soils and sediments off site may be affected by the following factors:

- The time required to characterize samples of the contaminated soil.
- Any additional volumes of debris encountered during excavation.
- The number of unanticipated obstructions encountered during excavation.
- The suitability of weather conditions.
- Access limitations imposed by the railroad to accommodate its operation.

Based on the five criteria above, Alternative 3 is considered to have an overall moderate level of short-term effectiveness.

4.7.2 Implementability

The technical and administrative feasibility and availability of resources required to implement Alternative 3 are discussed below.

4.7.2.1 Technical Feasibility

Alternative 3 is considered to have low to medium technical complexity, primarily because access to Site 30 is limited. Obtaining permission for construction within and near the railway easements, as well as mobilization of earth-moving equipment and truck transport of soil on and off the site, will be the greatest challenges. The Navy must consult with BNSF and Union Pacific on potential crossing of the rail lines and working within the rights-of-way. These constraints could delay the construction schedule by up to 3 to 6 months.

This alternative will use standard construction methods. Some added regulatory constraints will be encountered because Site 30 is a wetland. After site reconstruction, annual monitoring for 1 to 3 years may be necessary to document that the wetland habitat has been re-established.

4.7.2.2 Administrative Feasibility

The alternative is administratively feasible. However, coordination with multiple regulatory agencies will be necessary to comply with action-specific ARARs.

4.7.2.3 Availability of Required Resources

Off-site commercial disposal capacity will be adequate to manage the relatively small volume of contaminated soil generated from Site 30 (approximately 4,400 yd^3). Several Class II and III permitted landfills are located close to Site 30. The nearest Class I permitted landfill is located near Kettleman City, California. Many remediation firms have the equipment and specialists necessary to implement this alternative. However, sources of backfill for the wetland may not be near the site, making transport of this material difficult.

Overall, Alternative 3 is considered to be moderately-highly implementable based on the technical and administrative challenges associated with this alternative.

4.7.3 Cost

The overall cost of this alternative is considered moderate to high because of the high cost for importing suitable wetland backfill material to Site 30. Capital costs for this alternative assume that (1) the existing unimproved road that runs between the existing railroad tracks can be improved for use as a haul route to Site 30; (2) a haul route to Site 30 is not located within a habitat for any threatened or endangered species; (3) there are no federal jurisdictional issues

related to the haul route locations; and (4) there is no agreement in place between the Navy and regulatory agencies related to habitat issues. O&M costs associated with this alternative include annual monitoring for 1 to 3 years to document that wetland habitat is restored. The cost of the off-site Class I, II or III landfill disposal depends on several factors, such as (1) distance from Site 30 to the landfill, (2) the volume of waste that requires disposal, and (3) soil characterization.

Total estimated cost to complete this alternative is $1.6 million. The estimated cost, for this alternative can be reduced to $652,000 if analytical testing demonstrates that the landfill at site 1, Naval Weapons Station Seal Beach Detachment Concord (NWS SBD Concord) in Concord, California can accept the excavated debris and soil. Detailed cost estimates associated with this alternative are presented in Appendix B.

5.0 COMPARATIVE ANALYSIS OF REMOVAL ACTION ALTERNATIVES

The alternatives identified and described in Section 4.0 are evaluated in this section in detail to provide sufficient information to adequately compare them and select an appropriate remedy. The following alternatives are evaluated in this section:

- Alternative 1: No action with monitoring
- Alternative 2: Excavation, confirmation sampling, on-site disposal, LUCs, and habitat restoration
- Alternative 3: Excavation, confirmation sampling, off-site disposal, and habitat restoration.

The alternatives were evaluated for effectiveness, implementability, and cost. A summary of the comparative analysis is provided in Tables 6 and 7.

5.1 EFFECTIVENESS OF ALTERNATIVES

Each alternative is evaluated against five criteria to assess its effectiveness: (1) overall protection of human health and the environment; (2) compliance with ARARs; (3) long-term effectiveness and permanence; (4) reduction in toxicity, mobility, or volume; and (5) short-term effectiveness. Each of these criteria is discussed in the following paragraphs.

5.1.1 Overall Protection of Human Health and the Environment

Alternative 3 will provide the greatest overall protection to human health and the environment. Contaminated debris and soils are removed and disposed of off site in Alternative 3, preventing exposure of humans and ecological receptors to COPCs and COECs in the most biologically active soil layer (0 to 3 feet bgs). Alternative 3 is the most protective because the excavated contaminated soil, sediments, and debris will be completely removed from Site 30.

Alternative 2 involves on-site disposal of the stabilized excavated material by constructing a disposal cell. Long-term monitoring will be required under this alternative. Site 30 cannot meet the "unrestricted use criteria" because of the land-use controls associated with the soil disposal cell.

Alternative 1 is not protective of human health or the environment under the unrestricted use (or residential) scenario because this alternative does nothing to prevent unrestricted use or address contaminants in soil, sediments, and debris that could pose a potential risk to human and ecological health.

5.1.2 Compliance with ARARs

Alternative 1 does not comply with ARARs. Alternatives 2 and 3 will comply with all ARARs identified and discussed in Section 3.4.

5.1.3 Long-term Effectiveness and Permanence

Alternative 1 provides no long-term effectiveness since site conditions will be unpredictable and uncontrolled and could result in future exposure to human and ecological receptors.

Alternative 2 presents some long-term residual risks since LUCs instituted at the disposal cell will need to be maintained

Alternative 3 provides the best overall long-term effectiveness because it is a permanent solution that presents no residual risks to the site or to human or ecological receptors.

5.1.4 Reduction in Toxicity, Mobility, and Volume through Treatment

Alternative 1 does not provide for a reduction in toxicity, mobility, or volume through treatment.

Alternative 2 will slightly increase the volume of waste, by 20 to 25 percent. It will reduce both the toxicity and mobility of hazardous substances.

Alternative 3 may require off-site treatment to comply with LDRs. This evaluation presumed that treatment will not occur. Therefore, Alternative 3 does not provide for a reduction in toxicity, mobility, and volume of hazardous substances at Site 30.

5.1.5 Short-term Effectiveness

Alternative 1 is considered the most effective in the short term because no remedial action will be taken.

Both Alternatives 2 and 3 are considered moderately effective in the short term, as both can be implemented with proper engineering controls to minimize short-term risk to human health and the environment.

5.2 IMPLEMENTABILITY OF ALTERNATIVES

Alternative 1 is the easiest to implement because only monitoring and no remedial action will be undertaken. Alternatives 2 and 3 are more difficult to implement because of the administrative actions as well as technical constructability issues. Alternative 2 is more difficult to implement than Alternative 3 because of the requirements for the soil disposal cell.

5.3 COST OF ALTERNATIVES

Table 8 summarizes the costs associated each alternative. The annual cost for Alternative 1, "No Action with Monitoring" is estimated at $330,000. The total costs for Alternatives 2 and 3 are estimated at $1.6 million each. A detailed description of the costs, including capital and O&M, is presented in Appendix B.

6.0 RECOMMENDED REMOVAL ACTION ALTERNATIVE

This draft EE/CA was performed in accordance with current EPA and U.S. Navy guidance documents for a NTCRA under CERCLA. This EE/CA was identified and analyzed alternative removal actions to address Site 30. Three alternatives were identified, evaluated, and ranked:

- Alternative 1: No action with monitoring
- Alternative 2: Excavation, confirmation sampling, on-site disposal, land use controls, and habitat restoration
- Alternative 3: Excavation, confirmation sampling, off-site disposal, and habitat restoration.

Results of the comparative analysis are summarized in Tables 6 and 7 and indicate that Alternative 3 ranks the highest among the three alternatives considered. Alternative 3 provides adequate protection to human and ecological health and is more implementable than Alternative 2 from a constructability standpoint.

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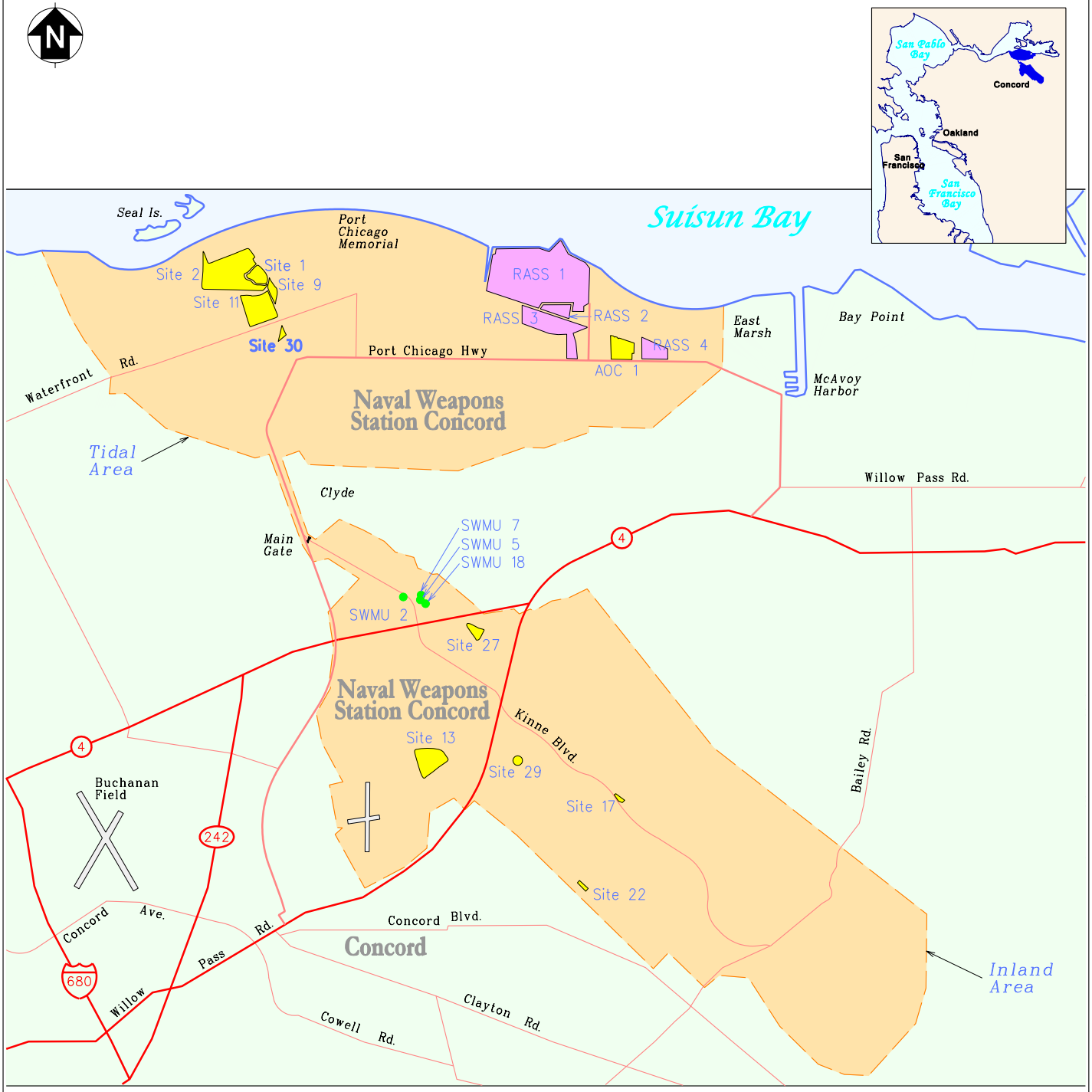
FIGURES



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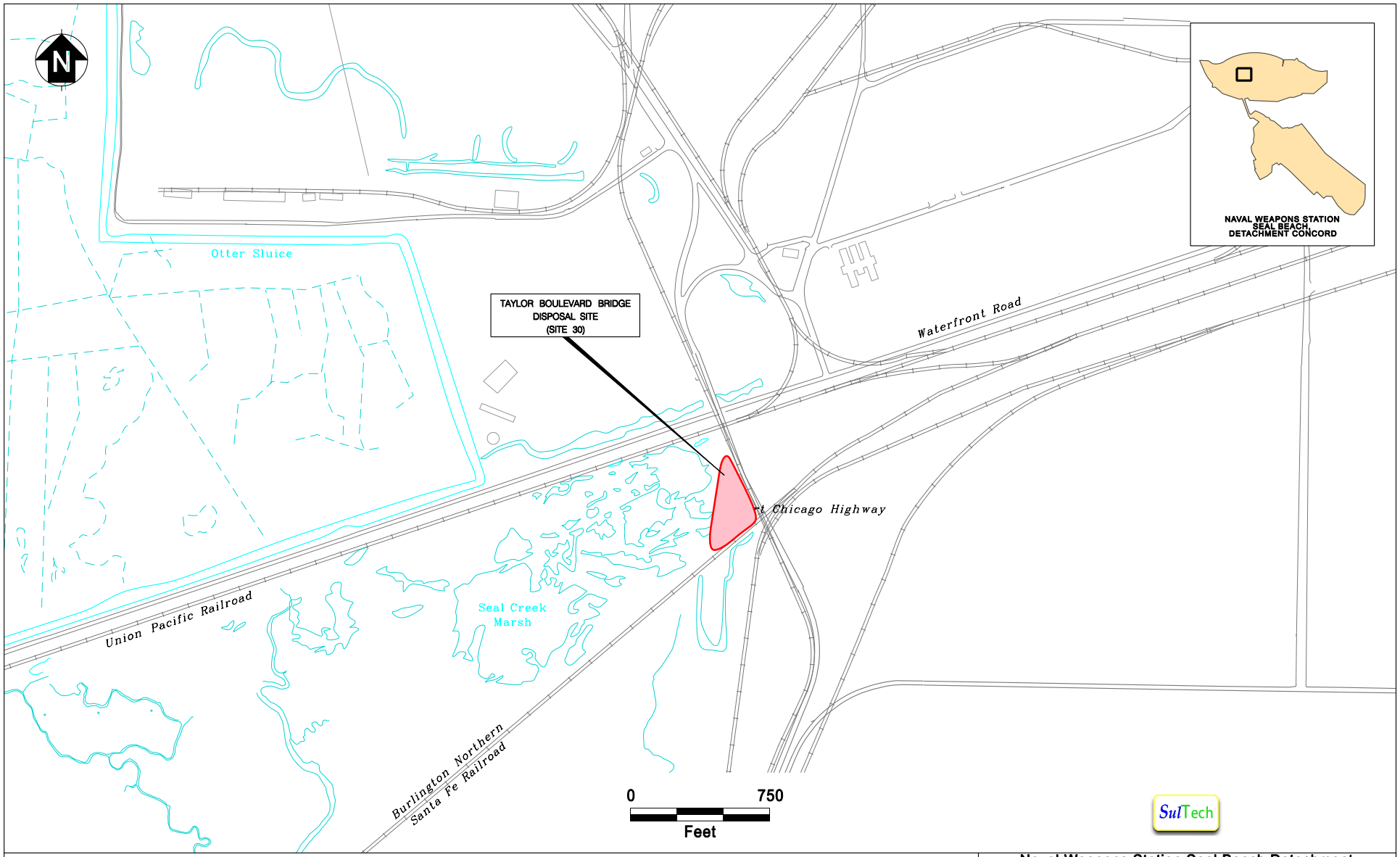
Concord, California
Integrated Product Team West, Daly City, CA

FIGURE 1
TIDAL AREA AND INLAND INVESTIGATION SITES

ENGINEERING EVALUATION AND COST ANALYSIS REPORT
FOR THE TAYLOR BOULEVARD BRIDGE (SITE 30)



Railroad Tracks
Road
Building
Wetlands

Naval Weapons Station Seal Beach Detachment
Concord, California
Integrated Product Team West, Daly City, CA

FIGURE 2
LOCATION OF
TAYLOR BOULEVARD BRIDGE
DISPOSAL SITE (SITE 30)

ENGINEERING EVALUATION AND COST ANALYSIS REPORT
FOR THE TAYLOR BOULEVARD BRIDGE (SITE 30)

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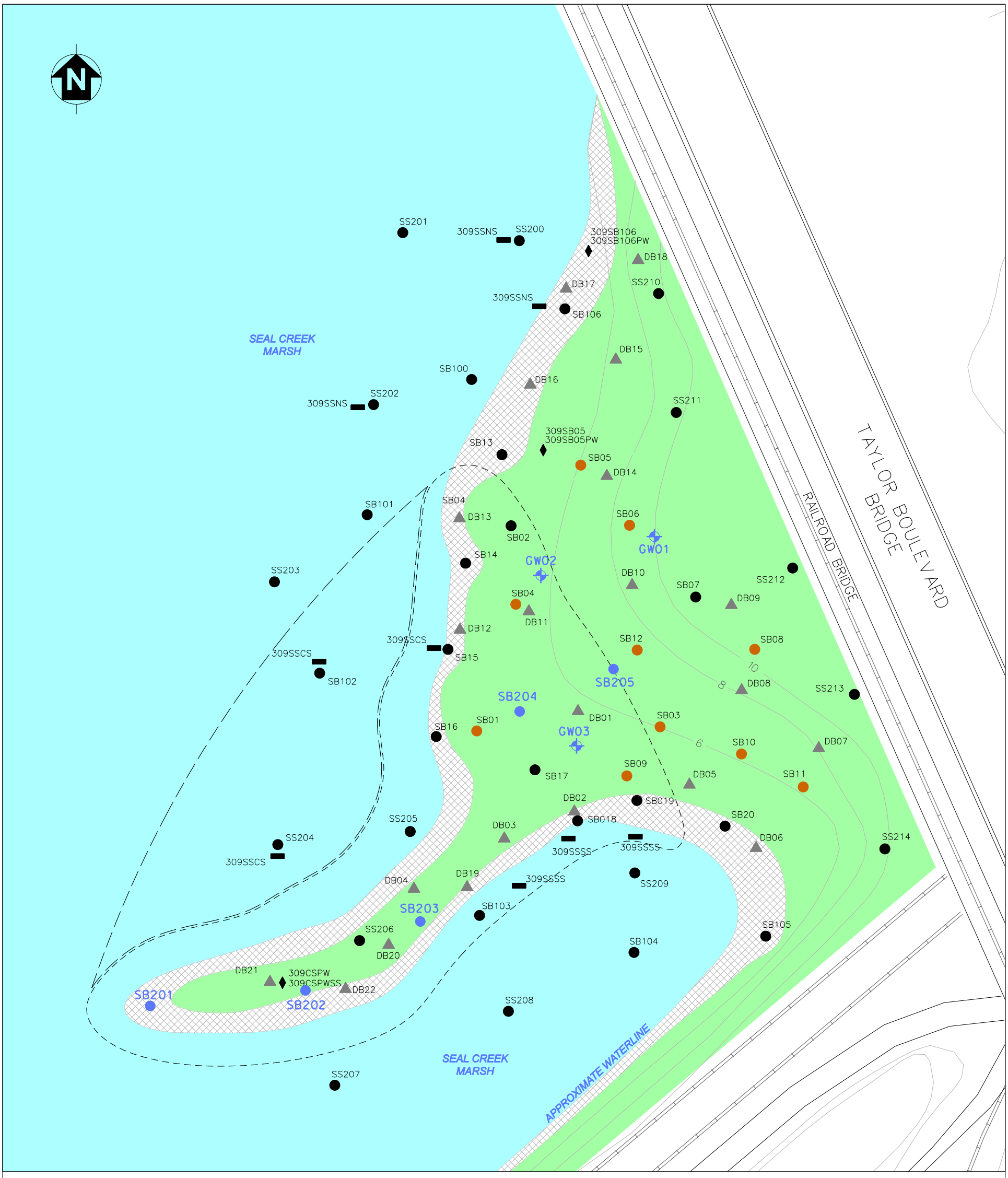

LEGEND:

- 2003 DEBRIS TEST HOLE AND SEDIMENT SAMPLE
- GROUNDWATER MONITORING WELL
- SOIL/SEDIMENT SAMPLE (0–0.5 FEET)
- SOIL/SEDIMENT SAMPLE (0–0.5 FEET AND 1.0–2.5 FEET)
- DEBRIS TEST HOLE
- 3 SAMPLES COMPOSITED FOR METALS ANALYSIS AND BIOASSAY
- PICKLEWEED TISSUE, COLLOCATED SEDIMENT ANALYSIS
- WETLAND AND UPLAND TRANSITIONAL HABITAT
- AQUATIC HABITAT
- SHORELINE: APPROXIMATE SEASONAL WATER LEVEL VARIATION
- AMPHIPOD TISSUE COLLECTION AREA
- APPROXIMATE SHORELINE
- 8 EXISTING ELEVATION CONTOURS
- APPROXIMATE EXTENT OF DEBRIS
- SCATTERED SURFACE DEBRIS

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FIGURE 3
SAMPLING LOCATION MAP
TAYLOR BOULEVARD BRIDGE DISPOSAL SITE

ENGINEERING EVALUATION AND COST ANALYSIS REPORT
FOR THE TAYLOR BOULEVARD BRIDGE (SITE 30)

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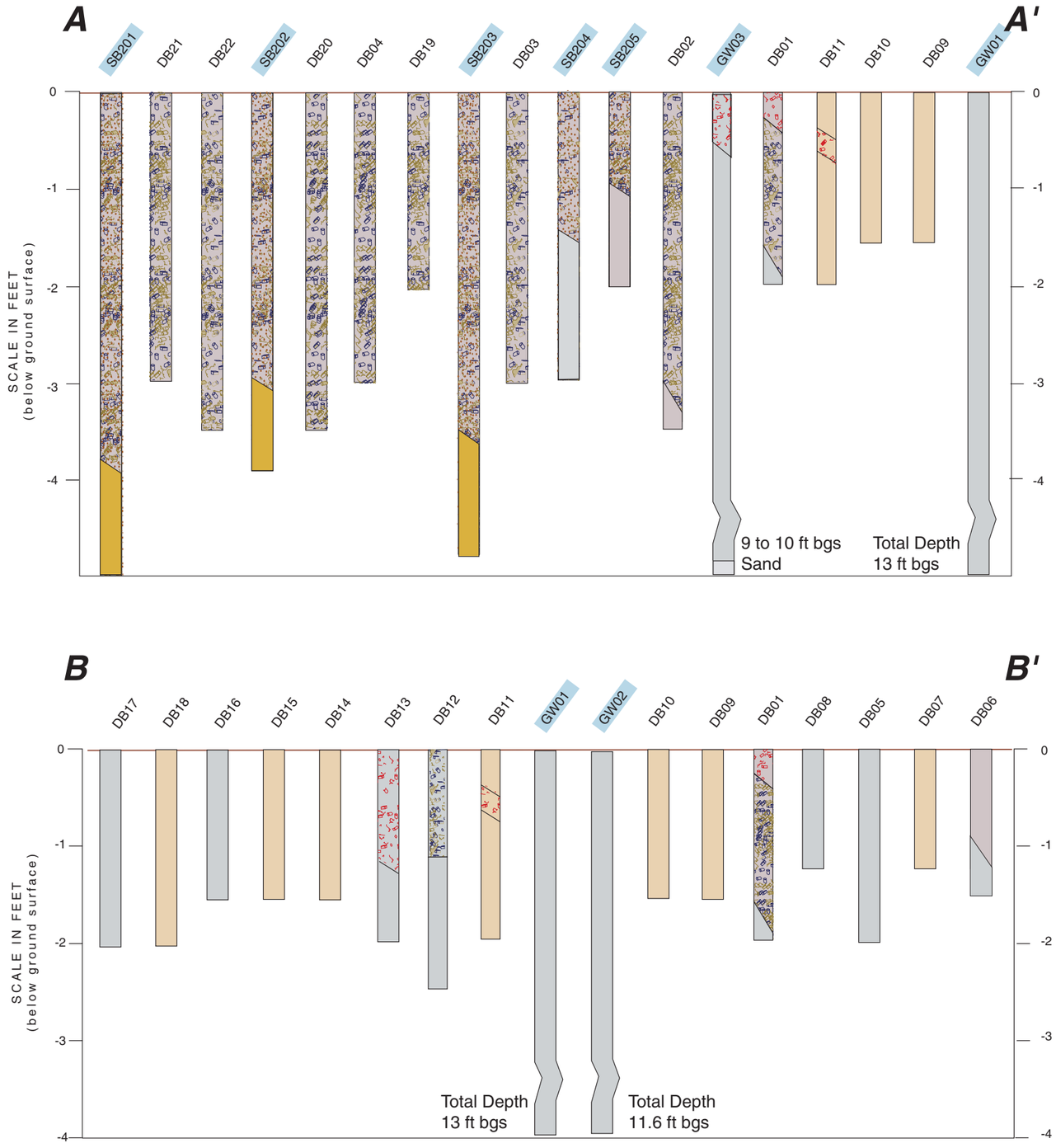

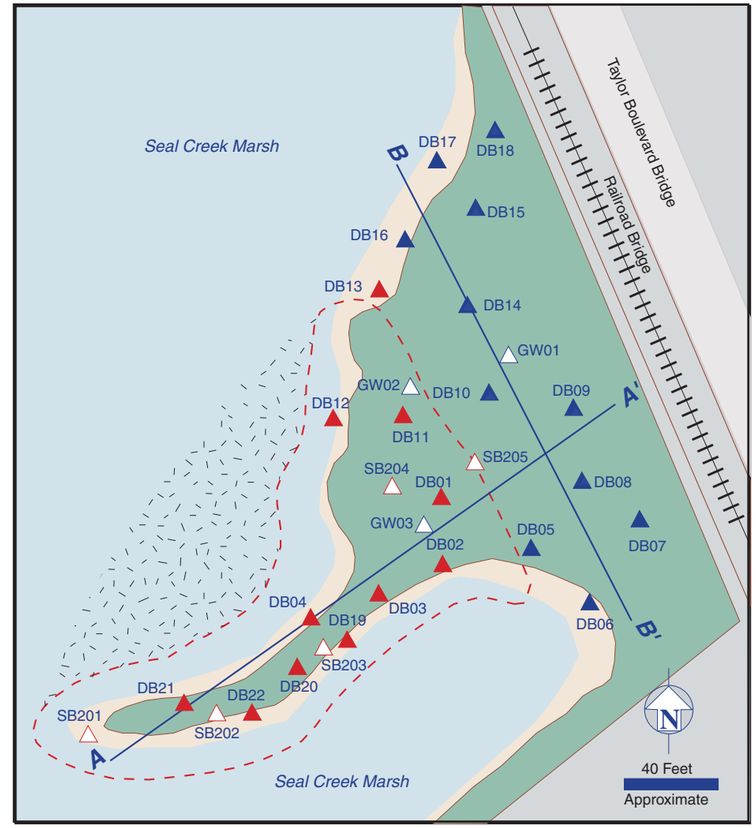

LEGEND

- Organic Silt
- Sandy Silt
- Clayey Silt
- Silty Clay
- Peat
- 2003 Location Debris Test Holes and Well Borings
- Debris Test Holes - no debris
- Debris Test Holes - with debris
- 2003 Debris Test Holes - with debris
- 2003 Well Borings
- Heavy Debris (>75%)
- Light Debris (<25%)
- Primary Surface and Subsurface Debris Area
- Scattered Surface Debris
- Shoreline: Approximate Seasonal Water Level Variation

Notes:
Horizontal distances are not to scale
ft bgs = feet below ground surface

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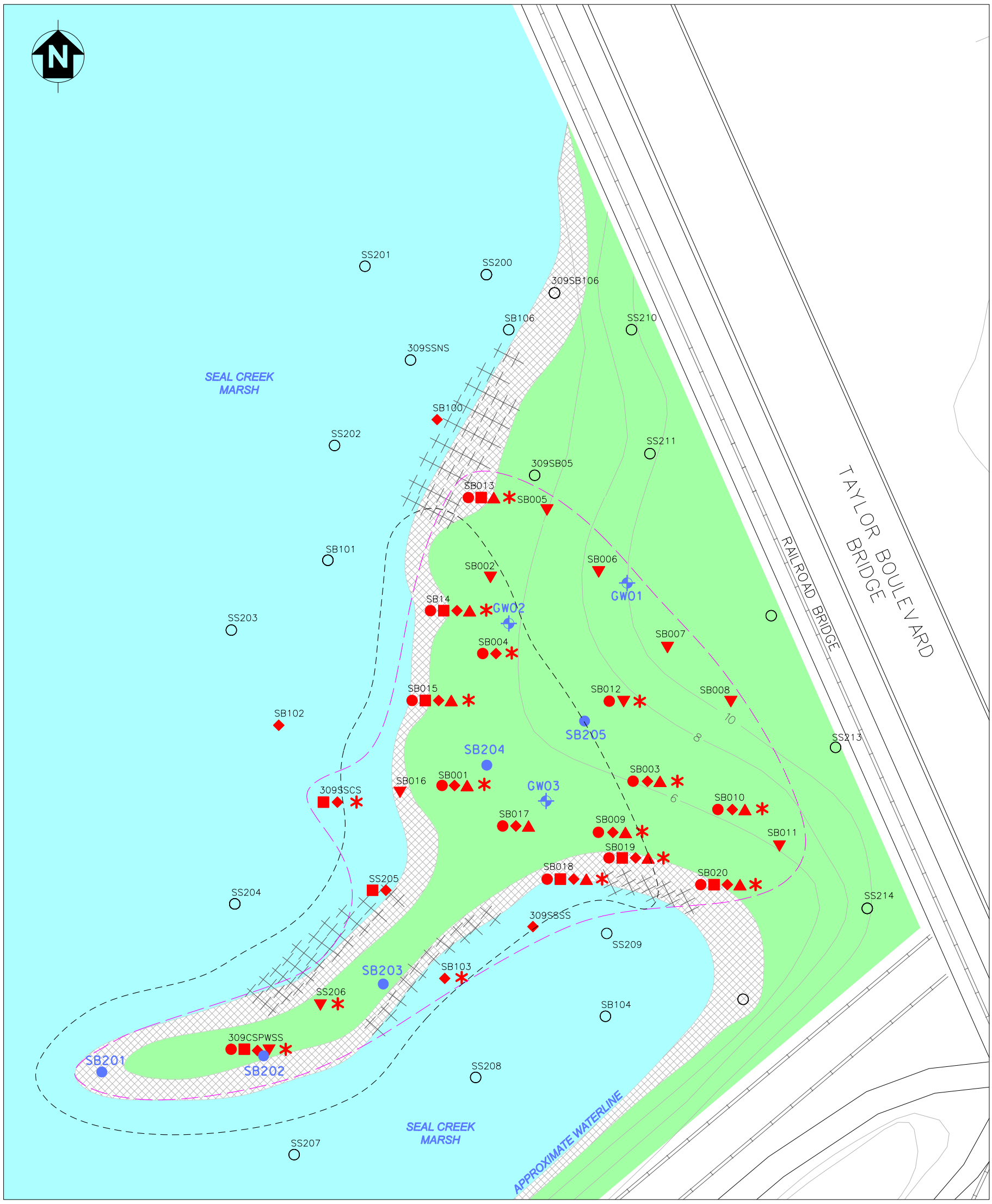
Concord, California
EFA West, Daly City, CA

FIGURE 4
TAYLOR BOULEVARD BRIDGE
DISPOSAL SITE
DEBRIS TEST HOLE PROFILES

ENGINEERING EVALUATION AND COST ANALYSIS REPORT
FOR THE TAYLOR BOULEVARD BRIDGE (SITE 30)



- 2003 DEBRIS TEST HOLE AND SEDIMENT SAMPLE
- GROUNDWATER MONITORING WELL
- MINIMAL RISK TO ASSESSMENT ENDPOINT RECEPTORS
- RISK TO HUMAN HEALTH; LEAD PRG > 400 mg/kg.
- RISK TO PLANTS INDICATED; SAMPLE LOCATION HAS FIVE OR MORE HQs GREATER THAN 1.0
- RISK TO BENTHIC INVERTEBRATES INDICATED; ONE OR MORE MEAN ER-Mq GREATER THAN 1.5
- RISK TO BIRDS INDICATED; SAMPLE LOCATION HAS ONE OR MORE METAL CONCENTRATIONS GREATER THAN 95th PERCENT UCL
- RISK TO SALT MARSH HARVEST MICE INDICATED; SAMPLE LOCATION HAS TWO OR MORE HQ (Low Dose/High TRV) GREATER THAN 1.0
- RISK TO SALT MARSH HARVEST MICE INDICATED; SAMPLE LOCATION HAS TWO OR MORE HQ (High Dose/High TRV) GREATER THAN 1.0
- WETLAND AND UPLAND TRANSITIONAL HABITAT
- AQUATIC HABITAT
- SHORELINE: APPROXIMATE SEASONAL WATER LEVEL VARIATION
- PRIMARY SURFACE AND SURFACE DEBRIS AREA
- APPROXIMATE RISK FOOTPRINT (HUMAN HEALTH + ECOLOGICAL)
- AMPHIPOD TISSUE COLLECTION AREA

20 0 20 40
Feet

NOTES:

UCL – UPPER CONFIDENCE LIMIT
mg/kg – MILLIGRAMS PER KILOGRAM
PRG – PRELIMINARY REMEDIATION GOAL
TRV – TOXICITY REFERENCE VALUE
ER-Mq – EFFECTS-RANGE MEDIAN QUOTIENT
HQ – HAZARD QUOTIENT

SAMPLES 309SSNS, 309SSSS, AND 309SSCS ARE COMPOSITES POOLED FROM THREE SEDIMENT SAMPLES

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FIGURE 5
ESTIMATED RISK TO ASSESSMENT ENDPOINT RECEPTORS TAYLOR BOULEVARD BRIDGE DISPOSAL SITE

ENGINEERING EVALUATION AND COST ANALYSIS REPORT FOR THE TAYLOR BOULEVARD BRIDGE (SITE 30)

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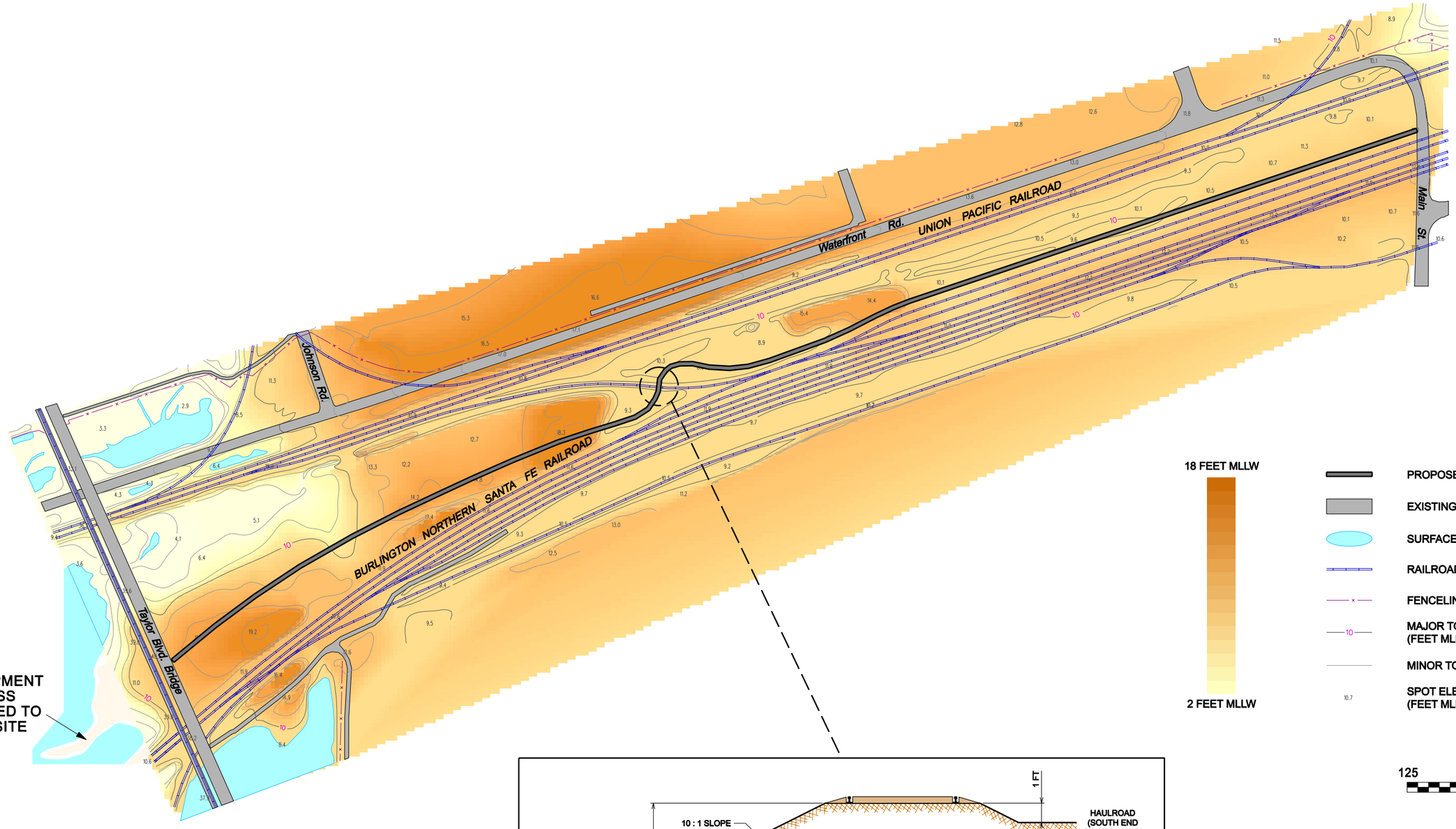


18 FEET MLLW

2 FEET MLLW

PROPOSED ACCESS ROAD

EXISTING ROAD

SURFACE WATER

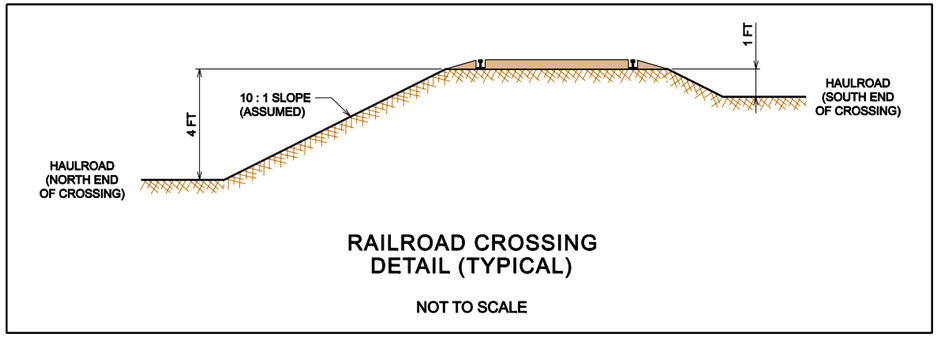
RAILROAD TRACK

FENCELINE

MAJOR TOPOGRAPHIC CONTOUR (FEET MLLW)

MINOR TOPOGRAPHIC CONTOUR

SPOT ELEVATION (FEET MLLW)



RAILROAD CROSSING DETAIL (TYPICAL)

NOT TO SCALE

125 0 125 250

Feet

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FIGURE 6
PROPOSED HAUL ROAD
TAYLOR BOULEVARD BRIDGE
SITE ACCESS ROAD

TtEMI-SF 10/28/2004 V:\Concord\Projects\Taylor_Site_Access\Road.dgn

35 x 35 ft
Grid

SEAL CREEK
MARSH

0.5
1.0
1.5
2.0
1.0
0.5
3.5
2.0
4.0
3.0
3.75
4.0
3.5

10
8
6

RAILROAD BRIDGE

TAYLOR BOULEVARD
BRIDGE

SEAL CREEK
MARSH

APPROXIMATE WATERLINE

20 0 20 40
Feet

MOUSE FENCE

AQUA BARRIER

PROPOSED BOTTOM CONFIRMATION SAMPLE

2.0 PROPOSED EXCAVATION BOUNDARY
NUMBER INDICATES DEPTH IN FEET

WETLAND AND UPLAND TRANSITIONAL HABITAT

AQUATIC HABITAT

SHORELINE: APPROXIMATE SEASONAL WATER LEVEL VARIATION

PRIMARY SURFACE AND SURFACE DEBRIS AREA

APPROXIMATE RISK FOOTPRINT (HUMAN HEALTH + ECOLOGICAL)

PROPOSED EXCAVATION AREA

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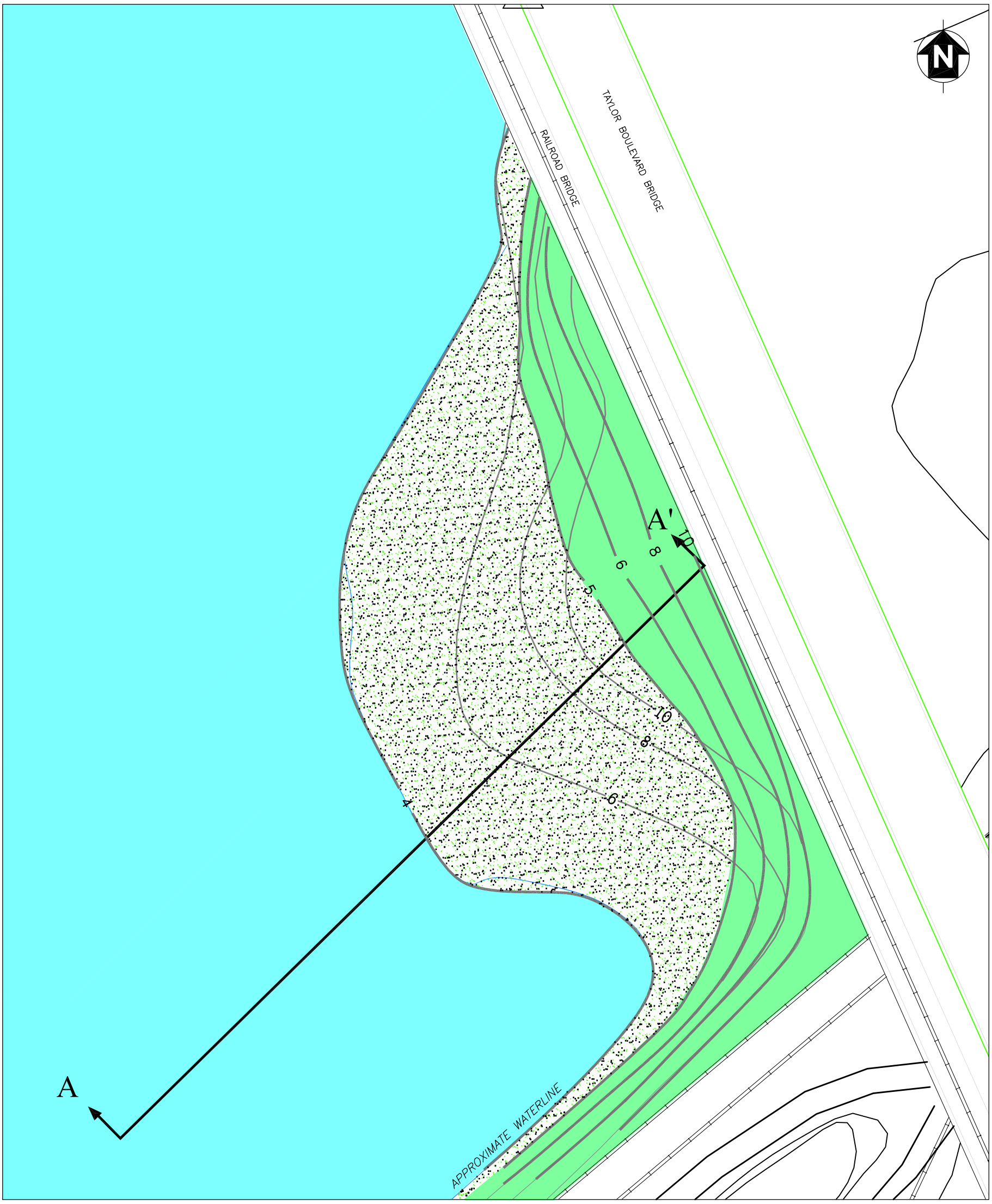
FIGURE 7
PROPOSED EXCAVATION FOOTPRINT

ENGINEERING EVALUATION AND COST ANALYSIS REPORT
FOR THE TAYLOR BOULEVARD BRIDGE (SITE 30)

10/29/2004 NORMAL.TBL j:\concord1\dgn\AECRU\D0045\Fig7_2003add.dgn



LEGEND:

- WETLAND AND UPLAND TRANSITIONAL HABITAT
- AQUATIC HABITAT
- WETLAND HABITAT (PICKLEWEED AND GUMPLANT)
- APPROXIMATE SHORELINE
- 8 EXISTING ELEVATION CONTOURS
- 6 NEW ELEVATION CONTOURS

20 0 20 40
SCALE IN FEET

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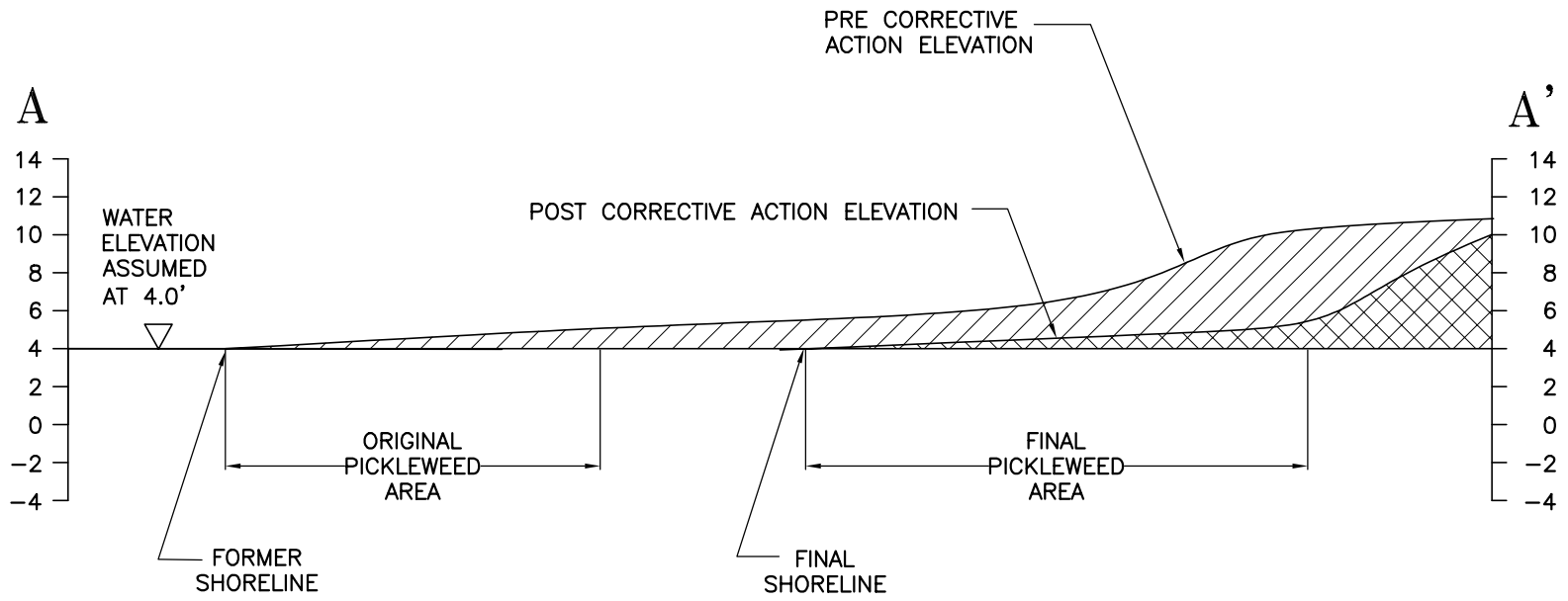
FIGURE 8
TAYLOR BOULEVARD BRIDGE
DISPOSAL SITE
CONCEPTUAL REGRADING PLAN

ENGINEERING EVALUATION AND COST ANALYSIS REPORT
FOR THE TAYLOR BOULEVARD BRIDGE (SITE 30)



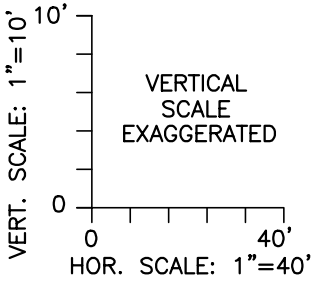


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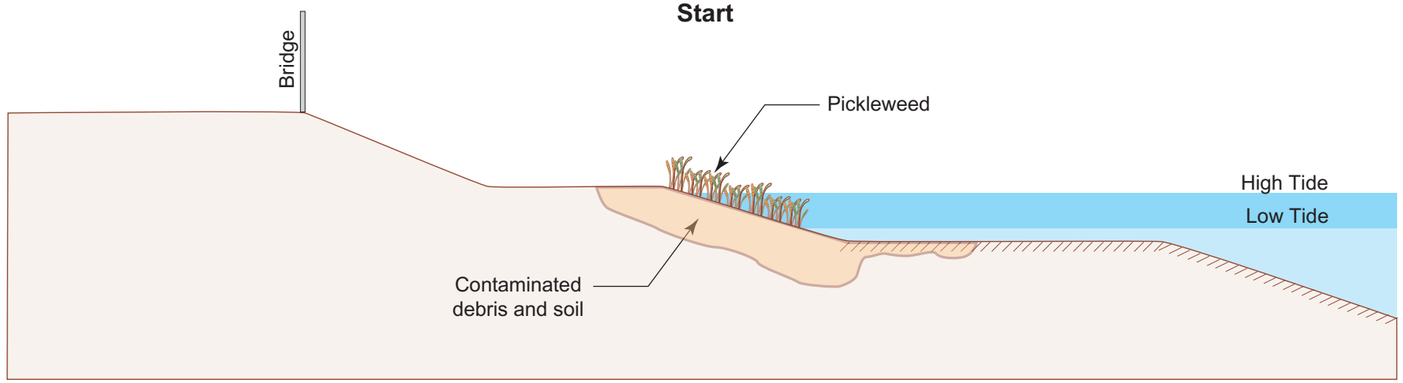
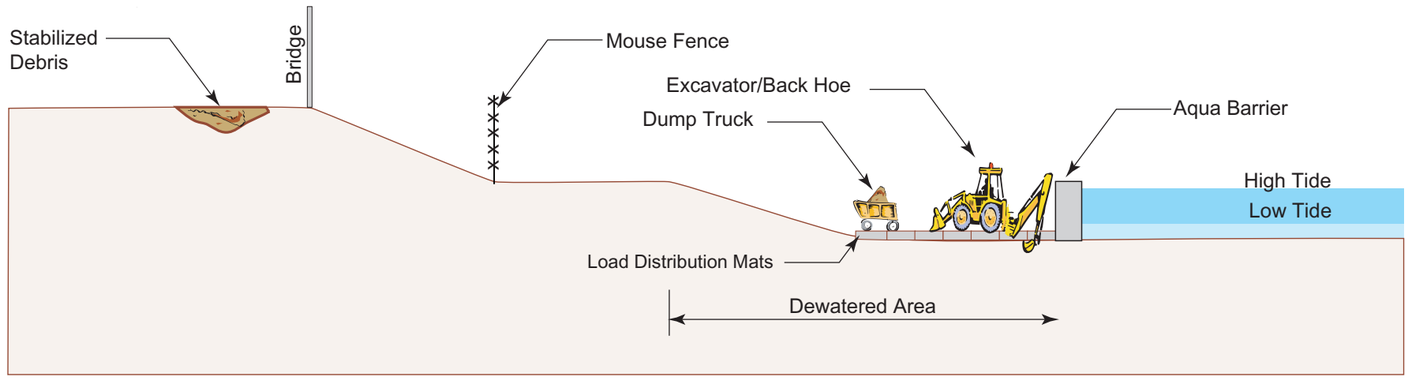
FIGURE 9
TAYLOR BOULEVARD BRIDGE
DISPOSAL SITE
CROSS SECTION SHOWING PROPOSED EXCAVATION AND SITE RECONSTRUCTION LIMITS

ENGINEERING EVALUATION AND COST ANALYSIS REPORT
FOR THE TAYLOR BOULEVARD BRIDGE (SITE 30)

Start



Construction Alternative 2



Post Construction Alternative 2

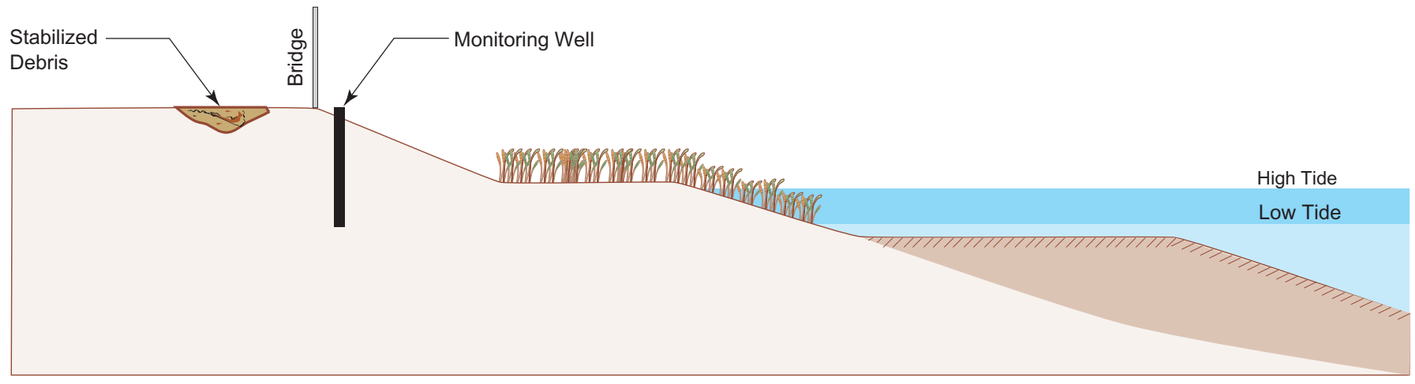


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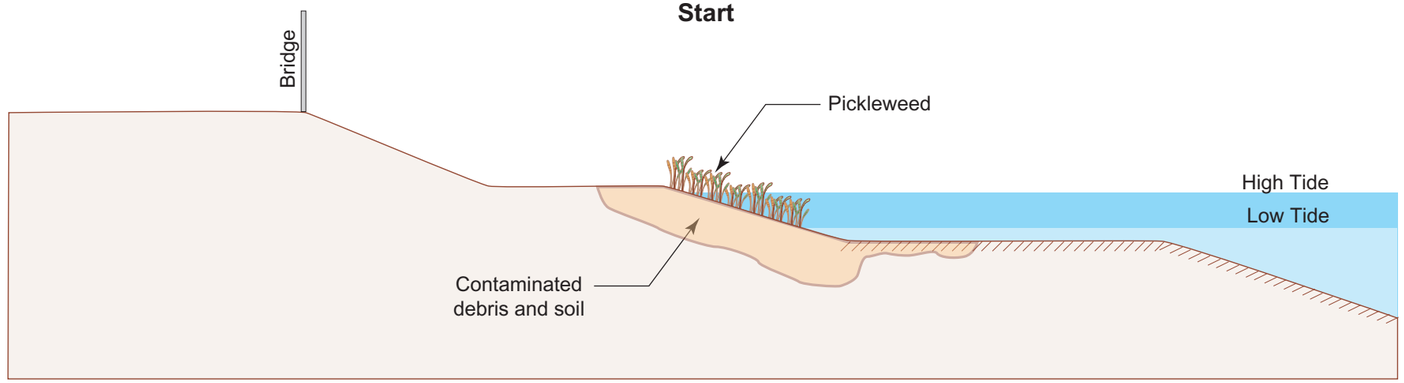
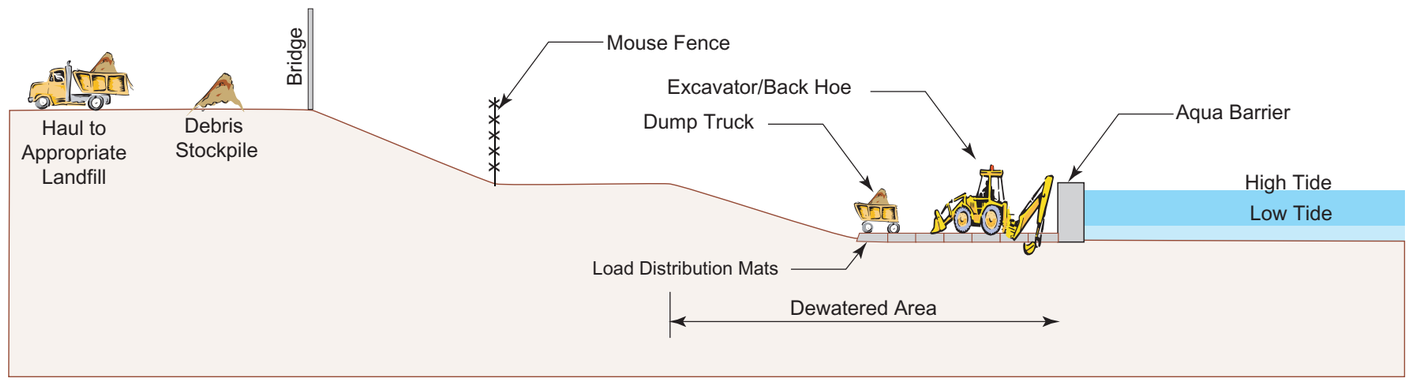
FIGURE 10
ALTERNATIVE 2 CONCEPTUAL MODEL
SITE 30

ENGINEERING EVALUATION AND COST ANALYSIS
FOR THE TAYLOR BOULEVARD BRIDGE (SITE 30)

Start



Construction Alternative 3



Post Construction Alternative 3

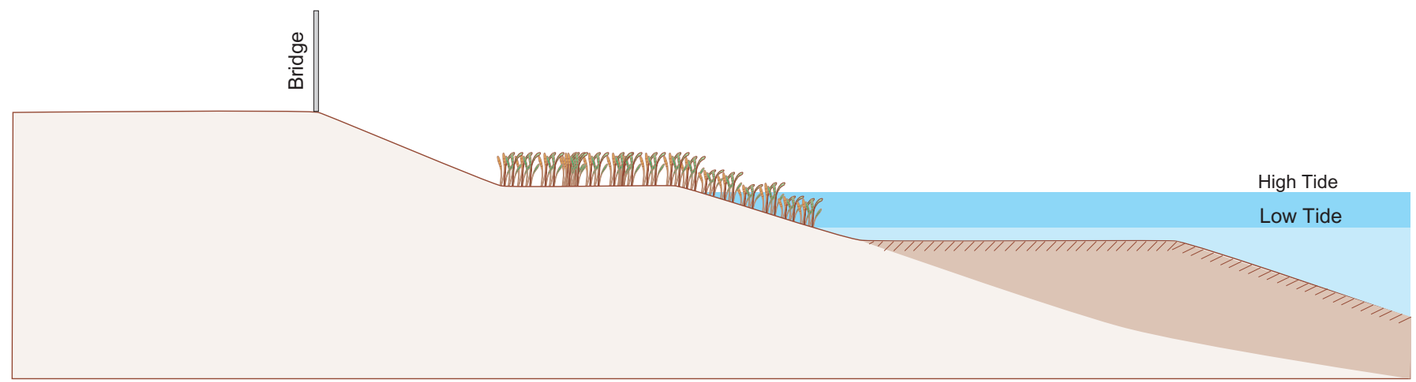


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FIGURE 11
ALTERNATIVE 3 CONCEPTUAL MODEL
SITE 30

ENGINEERING EVALUATION AND COST ANALYSIS
FOR THE TAYLOR BOULEVARD BRIDGE (SITE 30)

TABLES

TABLE 1: HISTORY OF SITE INVESTIGATIONS FOR TAYLOR BOULEVARD BRIDGE
Draft, Engineering Evaluation and Cost Analysis, Naval Weapons Station Seal Beach Detachment Concord, Concord, California

Date	Investigation	Investigation Objective	Investigation Activity	Analytical Groups	Summary of Analytical Results	Conclusions
February 1996 – June 1998	Initial Investigation [a]	**February 1996** - Delineate chemical concentrations in TBB site sediment. **March 1997 -** Evaluate lateral extent of metals and estimate approximate volume of materials to be removed as part of future removal action. **October 1997-June 1998** - Evaluate lateral extent of metals in surface sediment in adjacent submerged region of seal creek marsh.	**February 1996** - Six sediment samples collected from three borings: three samples at 0 to 0.5 feet bgs and three samples at 2 to 2.5 feet bgs. No samples were analyzed for pesticides and PCBs because the large amount of glass debris suggested a disposal area for household waste rather than industrial waste. **March 1997 -** Sampling at nine borings at 0 to 0.5 feet bgs and 1 to 1.5 feet bgs. **October 1997-June 1998** -Three rounds of surface sediment sampling, 48 samples collected.	**February 1996** - **SOIL:** SVOCs, metals, Total Peteroleum Hydrocarbons (TPH) purgeable and extractable. **March 1997 - SOIL**: Metals, TPH SVOC **October 1997-June 1998 - SOIL**: Metals	**Inorganic Chemicals in Sediments** • 60 sediment samples collected - Aquatic habitat - 17 surface sediments - Transitional habitat –20 surface and 12 subsurface samples collected - Shoreline – 11 surface sediments • Except for aluminum and beryllium, maximum detected concentrations of inorganic chemicals were in surface sediment samples. • Detailed analytical results can be found in Appendix D of the RI report **Organic Chemicals in Sediments** • 24 samples collected from wetland and upland transitional habitat • Highest concentration of SVOCs detected at location SB003 (Figure 3) • With the exception of phenol, SVOCs were not detected in subsurface sediment samples. • Detailed analytical results can be found in Appendix D of the RI report [a]	**February 1996** - Additional sampling required **March 1997** The pattern of organic chemicals detected does not suggest a significant spill, since deeper sediments are not affected. SVOCs and TPH will not be evaluated in future sampling rounds. Vertical extent of the site chemicals considered delineated, lateral extent of elevated metals concentrations not defined. Additional sampling required. Based on preliminary evaluations of the chemicals spatial distribution in sediment, removal action may be necessary. **October 1997-June 1998**: Additional sampling required to complete RI.
February - March 2000	ERA focused sampling [a]	Additional sampling to address the data needs for a baseline ecological risk assessment (BERA)	Three composite sediment samples, three collocated sediment and pickleweed samples, and three collocated sediment and amphipod tissue samples collected. 22 debris test holes were dug to characterize the depth and lateral extent of site debris.	**Composite sediment Samples**: Metals analysis and bioassays. **Pickleweed and Amphipods**: Tissue residue analysis	• Analytical results from the BERA sampling are discussed in Section 8 of the RI Report. • Peninsula section contains the greatest amount of debris extending to depths greater than 3.0 bgs. • Detailed information on the extent of site debris can be found in Section 2.3 of this report and Section 5.0 of the RI report [a]	Concentrations of inorganic chemicals (primarily lead) at the center of the site are higher than concentrations detected in surrounding areas and are sufficiently high to present a potential risk to plants, benthic invertebrates, and aquatic birds as well as a significant risk to the salt marsh harvest mouse. Removal of debris would significantly reduce risk to both human and ecological receptors Comments received from the U.S. EPA and the RWQCB on the draft and draft final RI (Tetra Tech 2002) indicated that additional RI activities needed to be conducted.

TABLE 1: HISTORY OF SITE INVESTIGATIONS FOR TAYLOR BOULEVARD BRIDGE (CONTINUED)
Draft, Engineering Evaluation and Cost Analysis, Naval Weapons Station Seal Beach Detachment Concord, Concord, California

Date	Investigation	Investigation Objective	Investigation Activity	Analytical Groups	Summary of Analytical Results	Conclusions
December 2001	RWQCB Surface Water Sampling	N/A	Seven surface water samples collected directly off-shore from the TBB site. Samples screened against freshwater continuous concentration criteria based on hardness from EPA State California Water Quality Criteria (California Toxics Rule) (EPA 2000; RWQCB 1995).	**Soil:** Total and dissolved metals.	• Concentrations for both total and dissolved metals were well below the ambient water quality control values calculated based on a hardness of 400 milligrams per liter (mg/L). • Detailed analytical results can be found in Appendix N of the RI report [a]	The RWQCB data support that the TBB Disposal Site is not a source of contamination to the Seal Creek Marsh.
November 2003 – February 2004	Supplemental RI Sampling [b]	Characterize groundwater quality. Assess the vertical extent of debris. Characterize the concentrations of inorganic and organic chemicals present in sediment beneath the debris.	Three groundwater monitoring wells installed. Groundwater samples collected to evaluate whether site related chemicals have migrated to groundwater and adversely affected groundwater quality. Vertical extent of debris assessed by hand-augering five borings to sediment just below the debris. Samples of underlying sediment were collected from each boring for analysis.	**Soil:** Total metals, hexavalent chromium, pesticides, PCBs, pesticides, SVOCs, VOCs, TPH, PH, TOC and dioxins. **Groundwater**: Total metals, hexavalent chromium, PCBs, pesticides, VOCs, SVOCs, TPH, TOC, TSS, PH and dioxins.	• Arsenic, cadmium, copper, lead, selenium, and zinc were detected in sediments above screening criteria. • Concentrations of metals were highest on the peninsula where the debris extends into groundwater. • At location SB-05, which is in the center of the site where debris does not intersect groundwater, concentrations beneath the debris were not elevated, which agrees with the findings of the RI (Tetra tech 2002) • Pesticides, PCBs, and SVOCs were not detected. Low concentrations of dioxins and furans were detected in one sediment sample. • Aluminum, arsenic, copper, mercury, and nickel were detected in groundwater at concentrations above screening criteria. • No SVOCs, pesticides, PCBs or dioxins were detected in groundwater samples • Groundwater level measurements collected from the wells suggest that the potiometric surface at the site was nearly flat (gradient less than 0.001 foot per foot) with a westward gradient of approximately 0.002 foot per foot.	Results of the investigation suggest that leaching from the debris to subsurface sediment may be occurring in low-lying areas of the site closest to the shoreline, where the debris is within the groundwater. The additional data obtained during the supplemental investigation support the conclusions of the RI Therefore, a non-time-critical removal action for the Site 30 is recommended

Notes:

a Tetra Tech. 2002. "Draft Final Remedial Investigation for Taylor Boulevard Bridge Disposal Site, Tidal Area, NWS SB, Detachment Concord." January 31, 2002.
b Tetra Tech. 2004. "Remedial Investigation Addendum Report for the Taylor Boulevard Bridge (Site 30), NWS SB, Detachment Concord." June 24, 2004.

bgs Below ground surface
BERA Baseline Ecological Risk Assessment
EPA U.S. Environmental Protection Agency
PCB Polychlorinated biphenyls
RWQCB Regional Water Quality Control Board
SVOC Semivolatile organic compound
TPH Total petroleum hydrocarbons
TOC Total organic carbon
TSS Total suspended solids
VOC Volatile organic compound

TABLE 2: SITE EVALUATION FOR TAYLOR BOULEVARD BRIDGE
Draft, Engineering Evaluation and Cost Analysis, Naval Weapons Station Seal Beach Detachment Concord, Concord, California

Sediment Evaluation		Groundwater Evaluation	
Organic Chemicals	**Inorganic Chemicals**	**Organic Chemicals**	**Inorganic Chemicals**
• Twenty-four sediment samples were analyzed specifically for TPH (extractable) and SVOCs (Figure 3). • Six sediment samples collected from locations SB001, SB002, and SB003 were also analyzed for TPH (purgeable). • All samples were collected from the wetland and upland transitional habitat. • Sediment samples from locations SB001 through SB003 were collected from 0 to 0.5 and 2.0 to 2.5 feet bgs. Sediment samples from SB004 through SB012 were collected from 0 to 0.5 and 1.0 to 1.5 feet bgs. • Petroleum hydrocarbons detected in sediment samples analyzed for extractable TPH were primarily TPH-mo. • TPH compounds (purgeable) were not detected in any samples. • The distribution of TPH in the sediment samples suggests a limited release of petroleum hydrocarbons, possibly caused by leakage of oil from construction vehicles and equipment dating from construction of the Taylor Boulevard automobile and railroad bridges. • Twenty-four sediment samples were analyzed for SVOCs. The highest concentration was detected in the surface sediment sample from location SB003. With the exception of phenol, SVOCs were not detected in subsurface sediment samples. • Detailed results can be found in the RI and RI addendum report (Tetra Tech 2002, Tetra Tech 2004)	• Sixth sediment samples were analyzed for metals, including 17 surface sediment samples (0 to 0.5 feet bgs) collected in the aquatic habitat, 20 surface and 12 subsurface sediment samples (1.0 to 2.5 feet bgs) from the "wetland and upland transitional" habitat, and 11 surface sediment samples collected from the shoreline (included in both aquatic and wetland and upland transitional habitats) (Figure 3). • The maximum detected concentration of arsenic (33 mg/kg), cadmium (6.10 mg/kg), copper (740 mg/kg), zinc (11,000 mg/kg), and selenium (1.2 mg/kg) was contained in the sediment sample collected from SB201 (Figure 3) • Sediment samples collected from locations SB201, SB202, SB203, and SB204 contained lead at concentrations that exceeded screening values. • Selenium was not detected in the sediment sample from SB202. • Zinc was detected at concentrations that exceeded benchmark screening values in sediment samples from locations SB201, SB202, and SB203. The maximum concentration of zinc was detected in the sample from SB201 (11,000 mg/kg). Concentrations of zinc that exceeded benchmark screening values detected in samples collected from SB202 (370 mg/kg) and SB203 (290 mg/kg) • With the exception of aluminum and beryllium, the maximum detected concentrations of inorganic chemicals were detected in surface sediment samples. • Lead was detected in all 60 sediment samples, lead concentrations ranged from 1.7 to 7,680 mg/kg • The Tidal Area ambient value for lead was exceeded in 31 samples. • Detailed results can be found in the RI and RI addendum report (Tetra Tech 2002; 2004).	• Groundwater samples were analyzed for pesticides, PCBs, VOCs, SVOCs, TPH, and one sample for Dioxin. No SVOCs, pesticides, PCBs, or dioxins were detected in any of the groundwater samples. • No VOCs were detected in groundwater except for trichloroethene (TCE). • TCE was detected in groundwater samples from all three wells ranging in concentration from .60 µg/L in wells GW01 and GW02 to 0.70 µg/L in GW03. Detected concentrations of TCE were only slightly greater than the detection limit of 0.50 µg/L. • An ambient water quality criteria value has not been established for TCE. • TPH-d was detected in the groundwater sample collected from well GW01 at a concentration of 0.10 mg/L. • TPH compounds were not detected in any other groundwater samples. There are currently no widely accepted screening criteria for TPH in groundwater. • Detailed Results can be found in appendix G of the draft final RI addendum report (Tetra Tech 2004)	• Concentrations of aluminum exceeded the groundwater screening criterion (87 µg/L) in samples from all three monitoring wells. The maximum concentration (1,100 µg/L) was detected at monitoring well GW02. The concentration of aluminum detected in the duplicate sample collected at monitoring well GW02 was 560 µg/L. • Arsenic exceeded the groundwater screening criterion (36 µg/L) at all three monitoring wells. The maximum concentration (150 µg/L) was detected at monitoring well GW01. Arsenic was also detected at 60 µg/L at GW03 and 37 µg/L at GW02. • Copper slightly exceeded the groundwater screening criterion (3.1 µg/L) at monitoring wells GW02 and GW03. The maximum concentration (3.7 µg/L) was detected at GW02 in the duplicate sample. Copper also exceeded the screening criterion in the original sample from GW02 (3.4 µg/L). • Mercury (unspeciated) exceeded the groundwater screening criterion (0.025 µg/L) at monitoring well GW02 in both the original and duplicate sample. The maximum concentration (0.24 µg/L) was detected at GW02 in the duplicate sample. • Nickel exceeded the groundwater screening criterion (8.2 µg/L) at all three monitoring wells. The maximum concentration (17 µg/L) was detected at GW02. • Detailed results can be found in Appendix G of the draft final RI addendum report (Tetra Tech 2004)

Notes:

a Tetra Tech. 2002. "Draft Final Remedial Investigation for Taylor Boulevard Bridge Disposal Site, Tidal Area, NWS SB, Detachment Concord." January 31, 2002.

µg/kg	Microgram per kilogram	SVOC	Semivolatile organic compound
mg/kg	Milligram per kilogram	TPH	Total petroleum hydrocarbons
PCB	Polychlorinated biphenyls	TOC	Total organic scarbon
RI	Remedial Investigation	TSS	Total suspended solids
RWQCB	Regional Water Quality Control Board	VOCs	Volatile organic compound

TABLE 3: CHEMICALS OF CONCERN

Draft, Engineering Evaluation and Cost Analysis, Naval Weapons Station Seal Beach Detachment Concord, Concord, California

Constituents of Potential Concern	Maximum Concentration Within Risk Footprint (mg/kg)	Maximum Concentration Outside Risk Footprint (mg/kg)	Concord Tidal Area Ambient 99th % UCL - Benthic Invertebrates (mg/kg)[b] -	Human Health Based Target Level in Soil (mg/kg)[b]	SF Bay Ambient (mg/kg)[b]	Ecological Receptors at Risk
Arsenic	142	24.8	27	26 [a]	15.6	Pickleweed, salt marsh harvest mouse, black-necked stilt, mallard
Cadmium	13.4	1.6	1.9	9.0	0.33	Black-necked stilt, mallard
Chromium	2,990	148	82.1	210	112	Human Health
Copper	12,500	111	81.0	2,900	68.1	Pickleweed, salt marsh harvest mouse, black-necked stilt, mallard, benthic invertebrates
Iron	378,000	-	-	23,000	-	Human Health
Lead	7,680	268	95.0	400	43.2	Salt marsh harvest mouse, black-necked stilt, mallard, benthic invertebrates
Mercury	26	0.26	0.32	-	0.43	Salt marsh harvest mouse, black-necked stilt, mallard
Selenium	12	0.32	Not Available	-	0.64	Pickleweed, salt marsh harvest mouse, black-necked stilt, mallard, benthic invertebrates
Zinc	5,410	596	264	-	158	Pickleweed, salt marsh harvest mouse, black-necked stilt, mallard, benthic invertebrates
Benzo(a)pyrene	0.6	-	-	0.8 [a]	412	Human health
Benzo(b)fluoranthene	2.0	-	-	0.6 [a]	-	Human health

Notes:

a Ambient concentration (Tetra Tech EM Inc. 1997. "Draft Technical Memorandum Estimation of Ambient Concentrations of Polynuclear Aromatic Hydrocarbons in Soil, Mare Island, Vallejo, California." July)

b From RI addendum

mg/kg Milligram per kilogram

TABLE 4: DEVELOPMENT OF RISK FOOTPRINT
Draft, Engineering Evaluation and Cost Analysis, Naval Weapons Station Seal Beach Detachment Concord, Concord, California

Habitat	Sample Location	Arsenic	Cadmium	Chromium	Copper	Lead	Mercury	Zinc	Notes
	TA Ambient Level (mg/kg)	**27**	**1.9**	**82.1**	**81.0**	**95.0**	**0.3**	**264.0**	
W	SS206	7.7	1.6	28.9	565	486	0.025	983	Included in Risk Footprint (Figure 5)
W	SB002	5.8	0.025	21.2	25.7	34.7	0.030	89.5	Included in Risk Footprint (Figure 5)
W	SB003	142	5.5	125	6670	7680	26.4	3960	Included in Risk Footprint (Figure 5)
A	SS205	26.8	2.4	15.2	166	378	0.085	4980	Included in Risk Footprint (Figure 5)
W	SB001	58.4	0.28	136	608	2560	0.42	4090	Included in Risk Footprint (Figure 5)
W	SB012	6.6	0.035	27.6	71.7	749	0.030	196	Included in Risk Footprint (Figure 5)
B	309CSPWSS	57.0	7.8	73.4	311	2300	0.18	2270	Included in Risk Footprint (Figure 5)
A	SS204	15.7	3.4	38.2	199	165	1.5	609	Included in Risk Footprint (Figure 5)
A	309SSCS	32.6	2.4	50.8	130.0	547	0.21	1980	Included in Risk Footprint (Figure 5)
B	SB016	9.5	0.20	0.89	1.1	1.7	0.50	3.2	Included in Risk Footprint (Figure 5)
A	309SSSS	9.8	0.93	35.1	72.5	189	0.29	226	Included in Risk Footprint (Figure 5)
B	SB013	19.7	0.036	45.4	1030	597	0.39	912	Included in Risk Footprint (Figure 5)
W	SB010	34.0	13.4	100	12500	1870	0.69	4960	Included in Risk Footprint (Figure 5)
B	SB020	22.9	0.030	74.6	1980	1180	0.64	1800	Included in Risk Footprint (Figure 5)
A	SB103	21.8	0.27	33.5	182.0	506	0.21	502	Included in Risk Footprint (Figure 5)
W	SB009	37.8	3.3	43.1	327	1560	2.2	5410	Included in Risk Footprint (Figure 5)
B	SB015	57.7	0.065	2990	726	1020	0.16	1540	Included in Risk Footprint (Figure 5)
B	SB018	106	0.046	47.9	1670	1270	0.11	1130	Included in Risk Footprint (Figure 5)
B	SB014	61.4	0.035	78.0	270	3280	0.080	1660	Included in Risk Footprint (Figure 5)
W	SB004	61.2	2.8	119	378	5030	2.10	2100	Included in Risk Footprint (Figure 5)
B	SB019	52.7	0.033	85.0	432	1640	0.085	737	Included in Risk Footprint (Figure 5)
W	SB017	0.3	0.027	174	515	2030	0.070	2060	Included in Risk Footprint (Figure 5)
W	SB008	10.2	0.035	30.4	39.1	129	0.030	98.9	Included in Risk Footprint (Figure 5)
W	SB006	6.2	0.030	26.4	20.1	66.9	0.025	42.1	Included in Risk Footprint (Figure 5)
W	SB005	8.6	0.035	18.3	28.4	201	0.035	126	Included in Risk Footprint (Figure 5)
W	SB007	6.1	0.035	21.2	30.5	184	0.030	120	Included in Risk Footprint (Figure 5)
W	SB011	14.7	0.040	29.7	50.2	318	0.030	154	Included in Risk Footprint (Figure 5)
B	309SB106	7.7	0.31	29.4	21.7	268	0.0050	71.2	Excluded from Risk Footprint, lead elevated above TA Ambient Level, Risk Assessment[1] indicates minimal risk to endpoint receptors
B	309SB05	10.4	1.6	32.5	49.0	162	0.26	284	Excluded from Risk Footprint, lead elevated above TA Ambient Level, Risk Assessment[1] indicates minimal risk to endpoint receptors
W	SS214	8.1	0.38	24.0	17.5	195	0.028	79.0	Excluded from Risk Footprint, lead elevated above TA Ambient Level, Risk Assessment[1] indicates minimal risk to endpoint receptors
A	SB106	24.8	0.46	148	111	257	0.050	596	Excluded from Risk Footprint, chromium, lead, and zinc elevated above TA Ambient Level, Risk Assessment[1] indicates minimal risk to endpoint receptors

TABLE 4: DEVELOPMENT OF RISK FOOTPRINT (CONTINUED)
Draft, Engineering Evaluation and Cost Analysis, Naval Weapons Station Seal Beach Detachment Concord, Concord, California

Habitat	Sample Location	Arsenic	Cadmium	Chromium	Copper	Lead	Mercury	Zinc	Notes
	TA Ambient Level (mg/kg)	**27**	**1.9**	**82.1**	**81.0**	**95.0**	**0.3**	**264.0**	
A	SS200	18.8	0.94	53.3	91.0	163	0.12	358	Copper, lead, and zinc elevated above TA Ambient Level, Risk Assessment[1] indicates minimal risk to endpoint receptors
A	SB100	6.2	0.24	27.6	54.9	97.2	0.19	96.0	Excluded from Risk Footprint, lead elevated above TA Ambient Level, Risk Assessment[1] indicates minimal risk to endpoint receptors
W	SS212	3.1	0.36	31.2	19.6	56.3	0.025	104	Excluded from Risk Footprint, chemical concentrations below TA Ambient Level
W	SS213	7.4	0.69	24.1	57.1	110	0.25	337	Excluded from Risk Footprint, chemical concentrations below TA Ambient Level
W	SS211	3.1	0.0085	16.4	9.2	44.5	0.020	46.5	Excluded from Risk Footprint, chemical concentrations below TA Ambient Level
A	SS208	3.9	0.010	12.4	12.2	50.2	0.025	61.6	Excluded from Risk Footprint, chemical concentrations below TA Ambient Level
W	SS210	4.7	0.38	23.3	13.3	29.8	0.025	70.4	Excluded from Risk Footprint, chemical concentrations below TA Ambient Level
A	SS207	3.2	0.019	12.9	17.4	34.6	0.055	58.8	Excluded from Risk Footprint, chemical concentrations below TA Ambient Level
B	SB105	0.5	0.040	14.8	37.1	24.9	0.030	74.3	Excluded from Risk Footprint, chemical concentrations below TA Ambient Level
A	SB101	8.9	0.08	30.9	39.0	67.9	0.070	65.7	Excluded from Risk Footprint, chemical concentrations below TA Ambient Level
A	SS203	11.9	0.83	39.7	54.1	78.8	0.13	205	Excluded from Risk Footprint, chemical concentrations below TA Ambient Level
A	SS202	11.5	0.66	30.9	47.0	72.2	0.16	107	Excluded from Risk Footprint, chemical concentrations below TA Ambient Level
A	309SSNS	14.3	0.46	38.1	49.0	87.2	0.22	89.0	Excluded from Risk Footprint, chemical concentrations below TA Ambient Level
A	SS201	13.6	0.79	33.2	59.1	87.1	0.19	94.0	Excluded from Risk Footprint, chemical concentrations below TA Ambient Level
A	SS209	10.9	1.1	20.6	73.0	85.0	0.10	175	Excluded from Risk Footprint, chemical concentrations below TA Ambient Level
A	SB104	2.0	0.17	23.0	50.5	68.2	0.14	84.7	Excluded from Risk Footprint, chemical concentrations below TA Ambient Level
A	SB102	5.8	0.21	34.9	52.1	83.3	0.19	87.9	Excluded from Risk Footprint, chemical concentrations below TA Ambient Level

Notes:

For locations where surface and subsurface samples available, maximum concentration shown
One-half the detection limit substituted for non-detects
Shaded cells are locations outside of the concentrations of certain chemicals within the risk footprint were elevated, but demonstrate minimal risk to endpoint receptors.
A - Aquatic habitat - invertebrate receptors
B - Includes both aquatic and wetland habitat. These sample locations used for determining both invertebrate and plant and animal receptors.
W - Wetland habitat - plant and animal receptors
1 - Tech. 2002. "Draft Final Remedial Investigation for Taylor Boulevard Bridge Disposal Site, Tidal Area, NWS SB, Detachment Concord." January 31, 2002.

TABLE 5: SUMMARY OF REMEDIAL ACTION ALTERNATIVES

Draft, Engineering Evaluation and Cost Analysis, Naval Weapons Station Seal Beach Detachment Concord, Concord, California

Remedial Action Components[1]	Estimated Duration	Remedial Action Alternatives		
		1	2	3
Preconstruction Activities				
Haul road construction[2]	1 week		●	●
Mobilize equipment (wetlands)	1 day		●	●
Locate underground utilities	1 day		●	●
Installation of mouse fence and trapping by biological monitor	1 week		●	●
Install Aqua-Barriers	2 days		●	●
Well abandonment	2 days		●	●
Excavation of Debris				
Construction of soil disposal cell	1 week		●	
Dewatering	4 weeks		●	●
Excavation of contaminated soil and debris	4 Weeks		●	●
Confirmation sampling	4 weeks		●	●
Transportation and disposal of stabilized soil and debris onsite	4 weeks		●	
Transportation and disposal of contaminated soil and debris off-site	4 weeks			●
Post Construction Activities				
Wetlands restoration[3]	1-3 Years		●	●
Removal of temporary railroad crossing	2 days		●	●
Demobilize equipment	2 days		●	●

TABLE 5: SUMMARY OF REMEDIAL ACTION ALTERNATIVES (CONTINUED)
Draft, Engineering Evaluation and Cost Analysis, Naval Weapons Station Seal Beach Detachment Concord, Concord, California

Remedial Action Components[1]	Estimated Duration	Remedial Action Alternatives	Remedial Action Components[1]	Estimated Duration
Land use controls	Indefinite		•	
Monitoring	Alternative 1 (30 Years) Alternatives 2 and 3 (3 Years)	•	•	•

Notes:
1. Certain components will occur in parallel with others.
2. Haul road construction can take up to 3-6 months due to railroad crossing permitting and construction constraints.
3. Includes time to reestablish Pickle weed habitat.

TABLE 6: REMOVAL ACTION COMPARATIVE ANALYSIS
Draft, Engineering Evaluation and Cost Analysis, Naval Weapons Station Seal Beach Detachment Concord, Concord, California

Criterion	Alternative 1: No Action with Monitoring Comment	Alternative 2: Excavation, Confirmation Sampling, On-Site Disposal, Land Use Controls (LUCs) and Habitat Restoration Comment	Alternative 3: Excavation, Confirmation Sampling, Off-Site Disposal, and Habitat Restoration Comment
Effectiveness			
1. Overall Protection of Human Health and the Environment	Alternative 1 will not eliminate, reduce, or control the potential human health or ecological risk presented by contaminated soils/sediments at Site 30.	Alternative 2 is protective of human health and the environment by reducing the exposure to COPCs and COECs through removal, stabilization, and containment of soils and debris. Land use controls may be required for the on-site disposal cell.	Alternative 3 is protective of human health and the environment by reducing the exposure to COPCs and COECs through removal and off-site disposal of soils, sediments, and debris.
2. Compliance with ARARs	No action- or location-specific ARARs apply to this alternative.	Alternative 2 can be designed to meet all chemical-, location-, and action-specific ARARs.	Alternative 3 can be designed to meet all chemical-, location-, and action-specific ARARs.
3. Long-term Effectiveness and Permanence	Alternative 1 does not assure long-term effectiveness and permanence.	Alternative 2 is moderately effective of the long term. Environmental conditions may affect long-term containment mobility. Annual monitoring for 3-5 years may be required to document the successful revegetation of the wetland habitat.	Alternative 3 is effective in the long term. Residual risks will be permanently reduced to within acceptable levels by removing all affected soils, sediments, and debris. Annual monitoring for 3-5 years may be required to document the successful revegetation of the wetland habitat.
4. Reduction in Toxicity, Mobility, and Volume through Treatment	The mobility, toxicity and volume of hazardous substances at Site 30 will not be reduced under Alternative 1 because the contaminated soils, sediments, and debris will not be removed or treated.	Alternative 2 will effectively reduce the toxicity and mobility, but not the volume, of the waste. .	Alternative 3 is not effective in reduction of toxicity, mobility, or volume of hazardous substances removed from Site 30.
5. Short-term Effectiveness	Alternative 1 will not achieve the RAO for soils under the unrestricted land use scenario or the ecological RAOs. Monitoring will be in place for 30 years under this alternative. Alternative 1 is not considered effective in the short term.	Alternative 2 is effective in the short term. Excavation will have a temporary impact on the wetland habitat. Alternative 2 will take approximately 2 months to implement.	Alternative 3 is moderate-highly effective in the short term. The community is far removed from the site and unlikely to face any short-term risks during excavation and removal activities. Excavation will have a temporary impact on the wetland habitat. Alternative 3 will take approximately 1 month to implement.
Implementability			
6. Technical Feasibility and Commercial Availability	Readily implementable. No construction or administrative activities will be required to implement this alternative. A qualified biologist or environmental scientist would conduct monitoring.	Moderately implementable. Alternative 2 is considered low to medium in complexity based on the technical and administrative challenges associated with the alternative. However, resources required to complete associated remedial activities are available.	Moderately implementable. Alternative 3 is considered low to medium in complexity based on the technical and administrative challenges associated with the alternative. However, resources required to complete associated remedial activities are available.
COST			
7. Estimated Cost	$330,000	$1.6 million	$1.6 million

TABLE 7: COMPARISON OF REMEDIAL ALTERNATIVES
Draft, Engineering Evaluation and Cost Analysis, Naval Weapons Station Seal Beach Detachment Concord, Concord, California

	Taylor Boulevard Bridge Disposal Site		
Evaluation Criteria	**Alternative 1 No Action with Monitoring**	**Alternative 2 Excavation, Confirmation Sampling, On-Site Disposal, LUCs and Habitat Restoration**	**Alternative 3 Excavation, Confirmation Sampling, Off-Site Disposal, and Habitat Restoration**
Overall Protection of Human Health and the Environment	5	2	1
Compliance with ARARs	5	3	1
Long-Term Effectiveness	5	3	1
Reduction of Toxicity, Mobility, Volume	5	3	5
Short-Term Effectiveness	1	2	3
Implementability	1	3	2
Cost	1	3	3
State Acceptance (estimated)	5	2	1
Community Acceptance (estimated)	5	2	1
Sum	**33**	**23**	**18**
Overall Rating	**3**	**2**	**1**

Ranking Scale:

1 Meets Criteria Best
5 Meets Criteria Least

Note:

ARAR Applicable or Relevant and Appropriate Requirement

TABLE 8: COST ESTIMATE SUMMARY FOR REMEDIAL ALTERNATIVES

Draft, Engineering Evaluation and Cost Analysis, Naval Weapons Station Seal Beach Detachment Concord, Concord, California

Alternative	Capital Cost	Annual O&M Cost [a]	Total NPV Cost [b]
1 – No Action with Monitoring [c]	$51,021	$254,926	$323,022
2 – Removal, Stabilization, On-site Disposal, and Habit Restoration	$1,585,463	$10,803	$1,641,966
3 – Removal, Off-site Disposal, and Habitat Restoration	$1,699,600	$7,202	$1,752,502

Notes:

a Annual O&M costs including monitoring for the first five years.

b Total NPV cost includes capital costs and NPV of annual O&M cost. Present value calculated based on a 7 percent discount rate for 30 years.

c The "No Action" alternative includes costs for monitoring.

NPV Net present value

O&M Operation and Maintenance

APPENDIX A
APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS

CONTENTS

CONTENTS (Continued)

TABLES

ACRONYMS AND ABBREVIATIONS

§	Section
§§	Sections
ARAR	Applicable or relevant and appropriate requirement
BAAQMD	Bay Area Air Quality Management District
Bay	San Francisco Bay
Cal. Code Regs.	*California Code of Regulations*
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CFR	*Code of Federal Regulations*
ch.	Chapter
COC	Contaminant of concern
CWA	Clean Water Act
CZMA	Coastal Zone Management Act
div.	Division
DTSC	State of California Department of Toxic Substances Control
ELCR	Excess lifetime cancer risk
EP	Extraction procedure
EPA	U.S. Environmental Protection Agency
ESA	Endangered Species Act
Fed. Reg.	Federal Register
mg/L	Milligram per liter
Navy	U.S. Department of the Navy
NCP	National Oil and Hazardous Substances Pollution Contingency Plan
RCRA	Resource Conservation and Recovery Act
ROD	Record of decision
RWQCB	California Regional Water Quality Control Board
STLC	Soluble threshold limit concentration
SWRCB	State of California Water Resources Control Board
TBC	To be considered
TCLP	Toxicity characteristic leaching procedure
TDS	Total dissolved solids
tit.	Title
TTLC	Total threshold limit concentration
USACE	U.S. Army Corps of Engineers
USC	*United States Code*

1.0 INTRODUCTION

This appendix identifies and evaluates potential federal and State of California applicable or relevant and appropriate requirements (ARARs) from the universe of regulations, requirements, and guidance and sets forth the U.S. Department of Navy (Navy) determinations regarding potential ARARs for each response action alternative retained for detailed analysis in this engineering evaluation/cost analysis (EE/CA) report for Installation Restoration Site 30, the Taylor Bridge Boulevard Disposal Site (TBB Disposal Site) Naval Weapons Station Seal Beach Detachment (NWS SBD) Concord, formerly known as Naval Weapons Station Concord, is located in Concord, California.

This ARAR evaluation includes an initial determination of whether the potential ARARs actually qualify as ARARs and a comparison for stringency between the federal and state regulations to identify controlling ARARs. The identification of ARARS is an iterative process. The final determination of ARARs will be made by the Navy in the record of decision (ROD) after public review as part of the response action selection process.

1.1 SUMMARY OF CERCLA AND NCP REQUIREMENTS

Section 121(d) of the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA, 42 United States Code [USC] Section [§] 9621[d]), as amended, states that remedial actions at CERCLA sites must attain (or the decision document must justify the waiver of) any federal or more stringent state environmental standards, requirements, criteria, or limitations determined to be legally applicable or relevant and appropriate. Although Section 121 of CERCLA does not itself expressly require that CERCLA removal actions comply with ARARs, the United States Environmental Protection Agency (U.S. EPA) has promulgated a requirement in the National Oil and Hazardous Substances Pollution Contingency Plan (NCP) mandating that CERCLA removal actions ". . . shall, to the extent practicable considering the exigencies of the situation, attain applicable or relevant and appropriate requirements under federal environmental or state environmental or facility siting laws" (Title 40 Code of Federal Regulations [C.F.R.] § 300.415[j]) (40 C.F.R. § 300.415[j]). It is Navy policy to follow this requirement. Certain specified waivers may be used for removal actions, as is the case with remedial actions.

Applicable requirements are those cleanup standards, standards of control, and other substantive environmental protection requirements, criteria, or limitations promulgated under federal or state law that specifically address the situation at a CERCLA site. The requirement is applicable if the jurisdictional prerequisites of the standard show a direct correspondence when objectively compared to the conditions at the site. An applicable federal requirement is an ARAR. An applicable state requirement is an ARAR only if it is more stringent than federal ARARs.

If the requirement is not legally applicable, then the requirement is evaluated to determine whether it is relevant and appropriate. Relevant and appropriate requirements are those cleanup standards, standards of control, and other substantive environmental protection requirements, criteria, or limitations promulgated under federal or state law that, while not applicable, address problems or situations similar to the circumstances of the proposed

response action and are well suited to the conditions of the site (U.S. Environmental Protection Agency [EPA] 1988a). A requirement must be determined to be both relevant and appropriate in order to be considered an ARAR.

The criteria for determining relevance and appropriateness are listed in 40 *Code of Federal Regulations* (CFR) § 300.400(g)(2) and include the following:

- The purpose of the requirement and the purpose of the CERCLA action
- The medium regulated or affected by the requirement and the medium contaminated or affected at the CERCLA site
- The substances regulated by the requirement and the substances found at the CERCLA site
- The actions or activities regulated by the requirement and the response action contemplated at the CERCLA site
- Any variances, waivers, or exemptions of the requirement and their availability for the circumstances at the CERCLA site
- The type of place regulated and the type of place affected by the release or CERCLA action
- The type and size of structure or facility regulated and the type and size of structure or facility affected by the release or contemplated by the CERCLA action
- Any consideration of use or potential use of affected resources in the requirement and the use or potential use of the affected resources at the CERCLA site

According to CERCLA ARARs guidance (EPA 1988a), a requirement may be "applicable" or "relevant and appropriate," but not both. Identification of ARARs must be done on a site-specific basis and involve a two-part analysis: first, a determination whether a given requirement is applicable; then, if it is not applicable, a determination whether it is nevertheless both relevant and appropriate. It is important to explain that some regulations may be applicable or, if not applicable, may still be relevant and appropriate. When the analysis determines that a requirement is both relevant and appropriate, such a requirement must be complied with to the same degree as if it were applicable (EPA 1988a).

Tables A-1, A-2, and A-3 in this appendix present each potential ARAR with an initial determination of ARAR status (i.e., applicable, relevant and appropriate, or not an ARAR). For the determination of relevance and appropriateness, the pertinent criteria were examined to determine whether the requirements addressed problems or situations sufficiently similar to the circumstances of the release or response action contemplated, and whether the requirement was well suited to the site.

TABLE A-1: POTENTIAL CHEMICAL-SPECIFIC [a] APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS
Draft, Engineering Evaluation and Cost Analysis, Naval Weapons Station Seal Beach Detachment Concord, Concord, California

Requirement	Prerequisite	Citation[b]	Preliminary ARAR Determination	Comments
		SOIL		
Resource Conservation and Recovery Act (42 USC, ch. 82, §§ 6901–6991[i]) [c]				
Defines RCRA hazardous waste. A solid waste is characterized as toxic, based on the TCLP, if the waste exceeds the TCLP maximum concentrations.	Waste	CCR Title 22, §§ 66261.21, 66261.22(a)(1), 66261.23, 66261.24(a)(1), and 66261.100	Applicable	Applicable for determining whether excavated waste is hazardous
Land Disposal Restrictions prohibit disposal of hazardous waste unless treatment standards are met.	Hazardous waste land disposal	CCR Title 22 § 66268.7(f)	Applicable	This requirement is applicable if hazardous waste is to be disposed of on land.
		To Be Considered		
United States Environmental Protection Agency Region 9 Preliminary Remediation Goals(PRG)			TBC	The Navy has identified the Region 9 PRGs for lead (400 mg/kg) as a TBC criteria.

Notes:

a Many potential action-specific ARARs contain chemical-specific limitations and are addressed in the action-specific ARAR tables

b Only the substantive provisions of the requirements cited in this table are potential ARARs

c Statutes and policies, and their citations, are provided as headings to identify general categories of potential ARARs for the convenience of the reader; listing the statutes and policies does not indicate that the Navy accepts the entire statutes or policies as potential ARARs; specific potential ARARs are addressed in the table below each general heading; only pertinent substantive requirements of the specific citations are considered potential ARARs

§ Section
§§ Sections
ARAR Applicable or relevant and appropriate requirement
CCR *California Code of Regulations*
ch. Chapter
PRG Preliminary Remediation Goals
RCRA Resource Conservation and Recovery Act
TBC To be considered
TCLP Toxicity characteristic leaching procedure
USC United States Code

TABLE A-2: POTENTIAL LOCATION-SPECIFIC APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS

Draft, Engineering Evaluation and Cost Analysis, Naval Weapons Station Seal Beach Detachment Concord, Concord, California

Location	Requirement	Prerequisite	Citation[a]	Preliminary ARAR Determination	Comments
Federal					
Coastal Zone Management Act (16 USC §§ 1451–1464) [b]					
Within coastal zone	Conduct activities in a manner consistent with approved state management programs.	Activities affecting the coastal zone, including lands thereunder and adjacent shore land	16 USC § 1456(c) 15 CFR § 930	Applicable	Remedial alternatives will comply with the CZMA and San Francisco Bay Plan
Endangered Species Act of 1973 (16 USC §§ 1531–1543) [b]					
Habitat upon which endangered species or threatened species depend	Federal agencies may not jeopardize the continued existence of any listed species or cause the destruction or adverse modification of critical habitat. The Endangered Species Committee may grant an exemption for agency action if reasonable mitigation and enhancement measures such as propagation, transplantation, and habitat acquisition and improvement are implemented.	Determination of effect upon endangered or threatened species or its habitat. Critical habitat upon which endangered species or threatened species depend.	16 USC § 1536(a), (h)(1)(B)	Applicable	Applicable if endangered species are found at TBB Disposal Site
Executive Order No. 11990, Protection of Wetlands [b]					
Wetland	Action to minimize the destruction, loss, or degradation of wetlands	Wetland as defined by Executive Order No. 11990, Section 7	40 CFR § 6.302(a)	Applicable	Applicable to activities that result in the destruction, loss, or degradation of wetlands
Clean Water Act of 1977, as Amended, § 404 (33 USC § 1344) [b]					
Wetland	Action to prohibit discharge of dredged or fill material into wetland without permit	Wetland as defined by Executive Order No. 11990, Section 7	33 USC § 1344	Applicable	
Exec. Order No. 11988, Floodplain Management [b]					
Within floodplain	Actions taken should avoid adverse effects, minimize potential harm, restore and preserve natural and beneficial values.	Action that will occur in a floodplain (i.e., lowlands) and relatively flat areas adjoining inland and coastal waters and other flood-prone areas.	40 CFR § 6.302(b) 40 CFR pt. 6, app. A, excluding § 6(a)(2), 6(a)(4), and 6(a)(6)	Relevant and Appropriate	Substantive provisions may be potentially relevant and appropriate for response actions within a 100-year floodplain.

TABLE A-2: POTENTIAL LOCATION-SPECIFIC APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS (CONTINUED)
Draft, Engineering Evaluation and Cost Analysis, Naval Weapons Station Seal Beach Detachment Concord, Concord, California

Location	Requirement	Prerequisite	Citation[a]	Preliminary ARAR Determination	Comments
California					
Aquatic habitat	Action must be taken if toxic materials are placed where they can enter the waters of the state	Materials entering the waters of the state	Cal. Fish & Game Code § 5650(a)(b) &(f)	Relevant and Appropriate	This section is potentially relevant and appropriate
Wildlife species	Action must be taken to prohibit the taking of birds and mammals.	Taking of birds and mammals	Cal. Fish & Game Code § 3005	Relevant and Appropriate	This section is potentially relevant and appropriate.
Rare native plants	Prohibits the taking of rare or endangered native plants.	Taking of rare native plants	Cal. Fish & Game Code §1908	Not an ARAR	No rare or endangered native plants are impacted at the site.
Endangered species habitat	No person shall import, export, take, possess, or sell any endangered or threatened species or part or product thereof.	Threatened or endangered species determination on or before 01 January 1985 or a candidate species with proper notification.	Cal. Fish & Game Code § 2080	Relevant and Appropriate	This section is potentially relevant and appropriate.
Fully protected bird species/ habitat	Provides that it is unlawful to take or possess listed fully protected birds.	Taking of protected birds	Cal. Fish & Game Code § 3511	Not an ARAR	No fully protected birds will be taken at the site.
Wetlands	This policy seeks to provide for the protection, preservation, restoration, enhancement and expansion of wetland habitat in California.	Impact to wetlands	Fish and Game Commission Wetlands Policy (1988)	TBC	This section is a potential TBC criteria.
Fully protected mammals	This section prohibits the take or possession of listed fully protected mammals or their parts.	Taking of fully protected mammals	Cal. Fish & Game Code § 4700	Relevant and Appropriate	This section is potentially relevant and appropriate.
Fully protected reptiles and amphibians	This section prohibits the take or possession of fully protected reptiles and amphibians.	Taking of fully protected reptiles and amphibians	Cal. Fish & Game Code § 5050	Not an ARAR	No fully protected reptiles or amphibians will be taken at the site.
Birds	This section prohibits the take, possession or needless destruction of the nest or eggs of any bird except as otherwise provided.	Taking of birds	Cal. Fish & Game Code § 3503	Relevant and Appropriate	This section is potentially relevant and appropriate.

TABLE A-2: POTENTIAL LOCATION-SPECIFIC APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS (CONTINUED)
Draft, Engineering Evaluation and Cost Analysis, Naval Weapons Station Seal Beach Detachment Concord, Concord, California

Location	Requirement	Prerequisite	Citation[a]	Preliminary ARAR Determination	Comments
California (Continued)					
Birds of prey	This section prohibits the take, possession, or destruction of any birds in the orders of Falconiformes or Strigifomres (birds of prey) or to take, possess or destroy the nests or eggs of such birds.	Taking of birds of prey	Cal. Fish & Game Code § 3503.5	Not an ARAR	No birds of prey will be taken at the site.
Nongame birds	This section prohibits the take of nongame birds except in accordance with the regulations of the commission.	Taking of nongame birds	Cal. Fish & Game Code § 3800	Relevant and Appropriate	This section is potentially relevant and appropriate.
Fur-bearing mammals	This section provides that a fur-bearing mammal may only be taken with a trap, a firearm, bow and arrow, poison under a proper permit, or with the use of dogs.	Taking of fur-bearing mammals	Cal. Fish & Game Code § 4000	Not an ARAR	This section defines fur-bearing mammals as pine marten, fisher, wolverine, mink, river otter, gray fox, cross fox, silver fox, red fox, kit fox, raccoon, beaver, badger, and muskrat. No fur-bearing mammals will be impacted at the site.
Nongame mammals	This section provides that nongame mammals may not be taken or possessed except as otherwise provided.	Taking of nongame mammals	Cal. Fish & Game Code § 4150	Not an ARAR	No nongame mammals will be taken at the site.
Nongame animals	This regulation provides that nongame birds and mammals may not be taken except as provided in this section.	Taking of nongame animals	CCR, Title 14, § 472	Not an ARAR	No nongame birds or mammals will be taken at the site.
Tidal invertebrates	This section provides that it unlawful to possess or take, unless otherwise expressly permitted, mollusks, crustaceans, or other invertebrates unless a valid tidal invertebrate permit has been issued	Taking of invertebrates	Cal. Fish & Game Code § 8500	Relevant and Appropriate	This section is potentially relevant and appropriate.

TABLE A-2: POTENTIAL LOCATION-SPECIFIC APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS (CONTINUED)
Draft, Engineering Evaluation and Cost Analysis, Naval Weapons Station Seal Beach Detachment Concord, Concord, California

Location	Requirement	Prerequisite	Citation[a]	Preliminary ARAR Determination	Comments
California (Continued)					
Protected Amphibians	This regulation makes it unlawful to capture, collect, intentionally kill or injure, possess, purchase, propagate, sell, transport, import, or export any native reptile or amphibian, or parts thereof unless a permit has been issued.	Taking of protected amphibians	CCR, Title 14, § 40	Not an ARAR	No protected amphibians will be captured, collected, intentionally killed or injured, possessed, purchased, propagated, sold, transported, imported, or exported.
Fur-bearing mammals	This regulation makes it unlawful to take Fisher, marten, river otter, desert kit fox and red fox.	Taking of fur-bearing mammals	CCR, Title 14, § 460	Not an ARAR	No fur-bearing mammals will be taken at the site.
Fur-bearing mammals	This regulations states that fur-bearing mammals may only be taken with a firearm, bow and arrow, or with the use of dogs or traps in accordance with Section 465.5 and Section 3003.1 of the Fish and Game Code.	Taking of fur-bearing mammals	CCR, Title 14, § 465	Not an ARAR	No fur-bearing mammals will be taken at the site.

Notes:

a Only the substantive provisions of the requirements cited in this table are potential ARARs.

b Statutes and policies, and their citations, are provided as headings to identify general categories of potential ARARs for the convenience of the reader; listing the statutes and policies does not indicate that the Navy accepts the entire statutes or policies as potential ARARs; specific potential ARARs follow each general heading; only substantive requirements of the specific citations are considered potential ARARs.

§ Section
§§ Sections
ARAR Applicable or relevant and appropriate requirement
CCR *California Code of Regulations*
CFR *Code* of Federal Regulations
CZMA Coastal Zone Management Act
USC United States Code

TABLE A-3: POTENTIAL ACTION-SPECIFIC APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS

Draft, Engineering Evaluation and Cost Analysis, Naval Weapons Station Seal Beach Detachment Concord, Concord, California

Action	Requirement	Prerequisite	Citation	Preliminary ARAR Determination	Comments
EXCAVATION					
Federal Requirements					
RCRA (42 USC, ch. 82, §§ 6901-6991[i]) *					
On-site waste generation	Person who generates waste shall determine if that waste is a hazardous waste.	Generator of waste	CCR, Title 22 §§ 66262.10(a), 66262.11	Applicable	Applicable where hazardous waste is generated
LDRs prohibit disposal of hazardous waste unless treatment standards are met.	Hazardous waste land disposal	CCR, Title 22, § 66268.1(f)	CCR, Title 22, § 66268.1(f)	Applicable	Applicable if hazardous waste is to be disposed of on land
Hazardous waste accumulation	On-site hazardous waste accumulation is allowed for up to 90 days as long as the waste is stored in containers or tanks, on drip pads, or inside buildings, and is labeled and dated.	Accumulate hazardous waste	CCR, Title 22 § 66262.34	Applicable	Applicable if hazardous waste is generated and accumulated on site before transport
Pre-transport requirements	Hazardous waste must be packaged in accordance with DOT regulations prior to transport	Any operation where hazardous waste is generated	CCR, Title 22 § 66262.30	Applicable	Applicable if hazardous waste is to be transported
	Hazardous waste must be labeled in accordance with DOT regulations prior to transport	Any operation where hazardous waste is generated	CCR, Title 22 § 66262.31	Applicable	Applicable if hazardous waste is to be transported
	Provides requirements for marking hazardous waste prior to transport	Any operation where hazardous waste is generated	CCR, Title 22 § 66262.32	Applicable	Applicable if hazardous waste is to be transported
	A generator must ensure that the transport vehicle is correctly placarded prior to transport of hazardous waste.	Any operation where hazardous waste is generated	CCR, Title 22 § 66262.33	Applicable	Applicable if hazardous waste is to be transported
	Requires preparation of a manifest for transport of hazardous waste off site	Any operation where hazardous waste is generated	CCR, Title 22 §§ 66262.20-66262.23	Applicable	Applicable if hazardous waste is to be transported

TABLE A-3: POTENTIAL ACTION-SPECIFIC APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS (CONTINUED)
Draft, Engineering Evaluation and Cost Analysis, Naval Weapons Station Seal Beach Detachment Concord, Concord, California

Action	Requirement	Prerequisite	Citation	Preliminary ARAR Determination	Comments
Federal Hazardous Materials Transportation Law (49 USC §§ 5101-5127) *					
Transportation of hazardous material 49 USC §§ 5101-5127	Sets forth requirements for transporting hazardous waste, including representations that containers are safe, prohibitions on altering labels, marking requirements, labeling requirements, and placarding requirements	Interstate carriers transporting hazardous wastes and substances by motor vehicle	49 CFR §§ 171.2(f), 171.2(g), 172.300, 172.301,172.302, 172.303172.304, 172.312, 172.400, and 172.504	Relevant and appropriate	Relevant and appropriate for transporting hazardous materials on site.
Clean Air Act (42 USC § 7401 et seq.) *					
Excavation	Sets forth opacity limitations	Excavation	BAAQMD Regulation 6, Regulation 6-302	Applicable	Applicable for excavation activities.
Excavation	Prohibits the emission of particles in sufficient number to cause annoyance	Release of particles	BAAQMD Regulation 6-305	Applicable	This requirement is applicable for excavation activities.
Excavation	Provides requirements for maintaining, covering and stock-piling excavated soil.	Soil stockpile	BAAQMD Regulation 8, Rule 40	Relevant and appropriate	These requirements are applicable for excavation activities.
Clean Water Act of 1988, as Amended, Section 404 (33 USC, § 1344) *					
Storm water discharge	Order 99-08-DQW is the State of California general permit for stormwater discharge from construction activities. It requires use of best management practices to reduce pollutants.	Storm water discharge	SWRCB Order 99-08 adopted pursuant to 40 CFR Part 122, Subpart C	Relevant and appropriate	Order 99-08—DQW applies to excavation activities that affect at least 1 acre. Pursuant to the substantive permit requirements, best management practices will be taken to prevent construction pollutants from contacting storm water and keep erosion products from moving off site.

TABLE A-3: POTENTIAL ACTION-SPECIFIC APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS (CONTINUED)
Draft, Engineering Evaluation and Cost Analysis, Naval Weapons Station Seal Beach Detachment Concord, Concord, California

Action	Requirement	Prerequisite	Citation	Preliminary ARAR Determination	Comments
LAND USE CONTROLS					
California Civil Code*					
Land use controls	Provides conditions under which land use restrictions will apply to successive owners of land.	Transfer property from the Navy to a nonfederal agency	Cal. Civ. Code § 1471	Applicable	Substantive provisions are the following general narrative standard: "to do or refrain from doing some act on his or her own land … where (c) Each such act relates to the use of land and each such act is reasonably necessary to protect present or future human health or safety of the environment as a result of the presence of hazardous materials, as defined in Section 25260 of the California Health & Safety Code." This narrative standard would be implemented through incorporation of restrictive covenants in the deed at the time of transfer.
Cal. Code Regulations Title 22*					
Land Use Controls	Sets forth recording requirements for land use covenants.	Recorded Land Use Control	Title 22 CCR 67391.1	Applicable	The substantive provisions of § 67391.1 are potential ARARs.
California Health & Safety Code*					
Land Use Controls	Allows DTSC to enter into an agreement with the owner of a hazardous waste facility to restrict present and future land uses.	Transfer property from the Navy to a nonfederal agency	Cal. Health & Safety Code § 25202.5	Applicable	The substantive provisions of this section are the general narrative standards to restrict "present and future uses of all or part of the land on which the facility …is located."

TABLE A-3: POTENTIAL ACTION-SPECIFIC APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS (CONTINUED)
Draft, Engineering Evaluation and Cost Analysis, Naval Weapons Station Seal Beach Detachment Concord, Concord, California

Action	Requirement	Prerequisite	Citation	Preliminary ARAR Determination	Comments
California Health & Safety Code* (Continued)					
Land Use Controls	Provides a streamlined process to be used to enter into an agreement to restrict specific use of property in order to implement the substantive use restrictions of Cal. Health & Safety Code § 25232(b)(1)(A)–(E).	Transfer property from the Navy to a nonfederal agency	Cal. Health & Safety Code § 25222.1	Applicable	This section is a potential ARAR when the Navy is transferring property to a nonfederal entity. Cal. Health & Safety Code § 25222.1 provides the authority for the state to enter into voluntary agreements to establish land-use covenants with the owner of the property. The substantive provision of Cal. Health & Safety Code § 25222.1 is the general narrative standard: "restricting specified uses of the property."
Land Use Controls	Provides a process for obtaining a written variance from a land use restriction.	Transfer property from the Navy to a nonfederal entity	Cal. Health & Safety Code § 25233(c)	Applicable	This section is a potential ARAR for institutional controls where the Navy is transferring property to a nonfederal entity. Cal. Health & Safety Code § 25233(c) sets forth substantive criteria for granting variances from the uses prohibited in § 25232(b)(1)(A)-(E) based on specific environmental and health criteria.

TABLE A-3: POTENTIAL ACTION-SPECIFIC APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS (CONTINUED)

Draft, Engineering Evaluation and Cost Analysis, Naval Weapons Station Seal Beach Detachment Concord, Concord, California

Notes:

*	Statutes and policies, and their citations, are provided as headings to identify general categories of potential ARARs for the convenience of the reader. Listing the statutes and policies does not indicate that the Navy accepts the entire statutes or policies as potential ARARs; specific potential ARARs are addressed in the table below each general heading; only substantive requirements of specific citations are considered potential ARARs
§	Section
§§	Sections
ARAR	Applicable or relevant and appropriate requirement
BAAQMD	Bay Area Air Quality Management District
CCR	*California Code of Regulations*
CFR	*Code of Federal Regulations*
ch.	Chapter
DOT	U.S. Department of Transportation
DQW	Department of Water Quality
LDR	Land Disposal Restriction
Navy	Department of the Navy
PCB	Polychlorinated biphenyl
ppm	Part per million
RCRA	Resource Conservation and Recovery Act
SWRCB	State Water Resources Control Board
USC	United States Code

To qualify as a state ARAR under CERCLA and the NCP, a state requirement must be:

- A state law or regulation
- An environmental or facility siting law or regulation
- Promulgated (of general applicability and legally enforceable)
- Substantive (not procedural or administrative)
- More stringent than federal requirements
- Identified in a timely manner
- Consistently applied

To constitute an ARAR, a requirement must be substantive. Therefore, only the substantive provisions of requirements identified as ARARs in this analysis are considered to be ARARs. Permits are considered to be procedural or administrative requirements. Provisions of generally relevant federal and state statutes and regulations that were determined to be procedural or nonenvironmental, including permit requirements, are not considered to be ARARs. CERCLA § 121(e)(1), 42 USC § 9621(e)(1), states, "No Federal, State, or local permit shall be required for the portion of any removal or remedial action conducted entirely on-site, where such remedial action is selected and carried out in compliance with this section." The term *on-site* is defined for purposes of this ARARs discussion as "the areal extent of contamination and all suitable areas in very close proximity to the contamination necessary for implementation of the response action" (40 CFR § 300.5).

Nonpromulgated advisories or guidance issued by federal or state governments are not legally binding and do not have the status of ARARs. Such requirements may, however, be useful, and are "to be considered" (TBC). TBC (40 CFR § 300.400[g][3]) requirements complement ARARs but do not override them. They are useful for guiding decisions regarding cleanup levels or methodologies when regulatory standards are not available.

Pursuant to EPA guidance (EPA 1988a), ARARs are generally divided into three categories: chemical-specific, location-specific, and action-specific requirements. This classification was developed to aid in the identification of ARARs; some ARARs do not fall precisely into one group or another. ARARs are identified on a site basis for remedial actions where CERCLA authority is the basis for cleanup.

As the lead federal agency at, the Navy has primary responsibility for identifying federal ARARs at the TBB Disposal Site. Pursuant to the definition of the term "on-site" in 40 CFR § 300.5, the on-site areas part of this action include the TBB Disposal Site.

1.2 METHODOLOGY DESCRIPTION

The process of identifying and evaluating potential federal and state ARARs is described in this subsection.

1.2.1 General

As the lead federal agency, the Navy has primary responsibility for identification of potential ARARs for the TBB Disposal Site. In preparing this ARARs analysis, the Navy undertook the following measures consistent with CERCLA and the NCP:

- Identified federal ARARs for each response action alternative addressed in the EE/CA taking into account site-specific information for the TBB Disposal Site
- Reviewed potential state ARARs identified by the state to determine whether they satisfy CERCLA and NCP criteria that must be met in order to constitute state ARARs
- Evaluated and compared federal ARARs and their state counterparts to determine whether state ARARs are more stringent than the federal ARARs or are in addition to the federally required actions
- Reached a conclusion as to which federal and state ARARs are the most stringent and/or "controlling" ARARs for each alternative.

For contaminated soil at TBB Disposal Site, the removal action objectives are as follows:

- Promote overall protection of human health and the environment
- Restrict the potential for humans and other ecological receptors to contact chemical- or solid waste-contaminated soil near the ground surface within the TBB site.

The alternatives developed and evaluated in this EE/CA are designed to accomplish the above removal action objectives. The alternatives retained for detailed analysis in this EE/CA are:

Alternative 1: No Action with Monitoring

Alternative 2: Excavation, Onsite Disposal (Stabilization), Habitat restoration, Land use controls

Alternative 3: Excavation, Confirmation Sampling, Disposal, And Site Restoration

1.2.2 Identifying and Evaluating Federal ARARs

The Navy is responsible for identifying federal ARARs as the lead federal agency under CERCLA and the NCP. The final determination of federal ARARs will be made when the Navy issues the ROD for TBB Disposal Site. The federal government implements a number of federal environmental statutes that are the source of potential federal ARARs, either in the form of the statutes or regulations promulgated thereunder. Examples include the Resource Conservation and Recovery Act (RCRA), the Clean Water Act (CWA), the Safe Drinking Water Act (SDWA), the Toxic Substances Control Act (TSCA), and their implementing regulations, to name a few. See NCP preamble at 55 *Federal Register* (Fed. Reg.) 8764–8765 (1990) for a more complete listing.

The proposed response actions and alternatives were reviewed against all potential federal ARARs, including, but not limited to, those set forth at 55 Fed. Reg. 8764–8765 (1990) in order to determine if they are applicable or relevant and appropriate utilizing the CERCLA and NCP criteria and procedures for ARARs identification by lead federal agencies.

1.2.3 Identifying and Evaluating State ARARs

This section describes the process of identifying and evaluating potential state ARARs by the state and the Navy.

EPA guidance (EPA 1988b) recommends that the lead federal agency consult with the state when identifying state ARARs for remedial actions. In essence, the CERCLA/NCP requirements at 40 CFR § 300.515 for remedial actions provide that the lead federal agency request that the state identify chemical- and location-specific state ARARs upon completion of site characterization. The requirements also provide that the lead federal agency request identification of all categories of state ARARs (chemical-, location-, and action-specific) upon completion of identification of remedial alternatives for detailed analysis. The state must respond within 30 days of receipt of the lead federal agency requests. The remainder of this subsection documents the Navy's efforts to date to identify and evaluate state ARARs. The Navy intends to solicit state ARARs.

1.3 OTHER GENERAL ISSUES

General issues identified during the evaluation of ARARs for the TBB Disposal Site are discussed in the following subsections.

1.3.1 General Approach to Requirements of the Federal Resource Conservation and Recovery Act

RCRA is a federal statute passed in 1976 to meet four goals: protection of human health and the environment; reduction of waste; conservation of energy and natural resources; and elimination of the generation of hazardous waste as expeditiously as possible. The Hazardous and Solid Waste Amendments (HSWA) of 1984 significantly expanded the scope of RCRA by adding new corrective action requirements, land disposal restrictions, and technical requirements. RCRA, as amended, contains several provisions that are potential ARARs for CERCLA sites.

Substantive RCRA requirements are applicable to response actions on CERCLA sites if the waste is a RCRA hazardous waste, and either

- The waste was initially treated, stored, or disposed after the effective date of the particular RCRA requirement; or
- The activity at the CERCLA site constitutes treatment, storage, or disposal, as defined by RCRA (EPA 1988a).

The preamble to the NCP indicates that state regulations that are components of a federally authorized or delegated state program are generally considered federal requirements and potential federal ARARs for the purposes of ARARs analysis (55 Fed. Reg. 8666, 8742 [1990]). The State of California received approval for its base RCRA hazardous waste management program on July 23, 1992 (57 Fed. Reg. 32726 [1992]). The state of California "Environmental Health Standards for the Management of Hazardous Waste," set forth in Title 22 *California Code of Regulations*, Division 4.5 (Cal. Code Regs. tit. 22, div. 4.5), were approved by EPA as a component of the federally authorized state of California RCRA program. On September 26, 2001, California received final authorization of its revised State Hazardous Waste Management Program by the EPA (63 Fed. Reg. 49118 [2001]).

The regulations of Cal. Code Regs. tit. 22, div. 4.5, are therefore a source of potential federal ARARs for CERCLA response actions. The exception is when a state regulation is "broader in scope" than the corresponding federal RCRA regulations. In that case, such regulations are not considered part of the federally authorized program or potential federal ARARs. Instead, they are purely state law requirements and potential state ARARs.

The EPA July 23, 1992, notice approving the state of California RCRA program (57 Fed. Reg. 32726 [1992]) specifically indicated that the state regulations addressed certain non-RCRA, state-regulated hazardous wastes that fell outside the scope of federal RCRA requirements. Cal. Code Regs. tit. 22, div. 4.5, requirements would be potential state ARARs for such non-RCRA, state-regulated wastes.

A key threshold question for the ARARs analysis is whether or not the contaminants at TBB Disposal Site constitute federal hazardous waste as defined under RCRA and the state's authorized program or qualify as non-RCRA, state-regulated hazardous waste. Waste characterization is discussed below in Section 1.4.

1.4 WASTE CHARACTERIZATION

Selection of ARARs involves the characterization of wastes as described below. This section discusses RCRA hazardous waste determination, California-regulated, non-RCRA hazardous waste determination, and other California waste classifications.

1.4.1 RCRA Hazardous Waste Determination

Federal RCRA hazardous waste determination is necessary to determine whether a waste is subject to RCRA requirements at Cal. Code Regs. tit. 22, div. 4.5 and other state requirements at Cal. Code Regs. tit. 23, div. 3, Chapter (ch.) 15. The first step in the RCRA hazardous waste characterization process is to evaluate contaminated media at the site(s) and determine whether the contaminant constitutes a "listed" RCRA waste. The preamble to the NCP states that "… it is often necessary to know the origin of the waste to determine whether it is a listed waste and that, if such documentation is lacking, the lead agency may assume it is not a listed waste" (55 Fed. Reg. 8666, 8758 [1990]).

This approach is confirmed in EPA guidance for CERCLA compliance with other laws (EPA 1988a) as follows:

> "To determine whether a waste is a listed waste under RCRA, it is often necessary to know the source. However, at many Superfund sites, no information exists on the source of wastes. The lead agency should use available site information, manifests, storage records, and vouchers in an effort to ascertain the nature of these contaminants. When this documentation is not available, the lead agency may assume that the wastes are not listed RCRA hazardous wastes, unless further analysis or information becomes available that allows the lead agency to determine that the wastes are listed RCRA hazardous wastes."

RCRA hazardous wastes that have been assigned EPA hazardous waste numbers (or codes) are listed in Cal. Code Regs. tit. 22, Sections (§§) 66261.30–66261.33. The lists include hazardous waste codes beginning with the letters "F," "K," "P," and "U."

Knowledge of the exact source of a waste is required for source-specific listed wastes ("K" waste codes). Some knowledge of the nature or source of the waste is required even for listed wastes from nonspecific sources, such as spent solvents ("F" waste codes) or commercial chemical products ("P" and "U" waste codes). These listed RCRA hazardous wastes are restricted to commercially pure chemicals used in particular processes such as degreasing.

"P" and "U" wastes cover only unused and unmixed commercial chemical products, particularly spilled or off-specification products (EPA 1991a). Not every waste containing a "P"- or "U"-listed chemical is a hazardous waste. To determine whether a CERCLA investigation-derived waste contains a "P" or "U" waste, there must be direct evidence of product use. In particular, all the following criteria must be met. The chemicals must be:

- Discarded (as described in 40 CFR § 261.2[a][2]),
- Either an off-specification commercial product or a commercially sold grade,
- Not used (soil contaminated with spilled unused wastes is a "P "or "U" waste), and
- The sole active ingredient in a formulation.

The second step in the RCRA hazardous waste characterization process is to evaluate potential hazardous characteristics of the waste. The evaluation of characteristic waste is described in EPA guidance as follows (EPA 1988a):

> "Under certain circumstances, although no historical information exists about the waste, it may be possible to identify the waste as RCRA characteristic waste. This is important in the event that (1) remedial alternatives under consideration at the site involve on-site treatment, storage, or disposal, in which case RCRA may be triggered as discussed in this section; or (2) a remedial alternative involves off-site shipment. Since the generator (in this case, the agency or responsible

> party conducting the Superfund action) is responsible for determining whether the wastes exhibit any of these characteristics (defined in 40 C.F.R. §§ 261.21–261.24), testing may be required. The lead agency must use best professional judgment to determine, on a site-specific basis, if testing for hazardous characteristics is necessary.
>
> In determining whether to test for the toxicity characteristic using the extraction procedures (EP) toxicity test, it may be possible to assume that certain low concentrations of waste are not toxic. For example, if the total waste concentration in soil is 20 times or less the EP toxicity concentration, the waste cannot be characteristic hazardous waste. In such a case, RCRA requirements would not be applicable. In other instances, where it appears that the substances may be characteristic hazardous waste (ignitable, corrosive, reactive, or EP toxic), testing should be performed."

Hazardous waste characteristics as defined in 40 CFR §§ 261.21–261.24 are commonly referred to as ignitability, corrosivity, reactivity, and toxicity. California environmental health standards for the management of hazardous waste set forth in Cal. Code Regs. tit. 22, div. 4.5, were approved by EPA as a component of the federally authorized California RCRA program. Therefore, the characterization of RCRA waste is based on the state requirements.

The characteristics of ignitability, corrosivity, reactivity, and toxicity are defined in Cal. Code Regs. tit. 22, §§ 66261.21–66261.24. According to Cal. Code Regs. tit. 22, § 66261.24(a)(1)(A), "A waste that exhibits the characteristic of toxicity pursuant to subsection (a)(1) of this section has the EPA Hazardous Waste Number specified in Table I of this section which corresponds to the toxic contaminant causing it to be hazardous." Table I assigns hazardous waste codes beginning with the letter "D" to wastes that exhibit the characteristic of toxicity; D waste codes are limited to "characteristic" hazardous wastes.

According to Cal. Code Regs. tit. 22, § 66261.10, waste characteristics can be measured by an available standardized test method or be reasonably classified by generators of waste based on their knowledge of the waste provided that the waste has already been reliably tested or if there is documentation of chemicals used

The requirements at Cal. Code Regs. tit. 22, § 66261.24, list the toxic contaminant concentrations that determine the characteristic of toxicity. The concentration limits are in milligrams per liter (mg/L). These units are directly comparable to total concentrations in waste groundwater and surface water. For waste soils, these concentrations apply to the extract or leachate produced by the toxicity characteristic leaching procedure (TCLP).

A waste is considered hazardous if the contaminants in the wastewater or in the soil TCLP extract equal or exceed the TCLP limits. TCLP testing is required only if total contaminant concentrations in soil equal or exceed 20 times the TCLP limits because TCLP uses a 20-to-1 dilution for the extract (EPA 1988a).

1.4.2 California-Regulated, Non-RCRA Hazardous Waste

A waste determined not to be a RCRA hazardous waste may still be considered a state-regulated, non-RCRA hazardous waste. The state is broader in scope in its RCRA program in determining hazardous waste. Cal. Code Regs. tit. 22, § 66261.24(a)(2), lists the total threshold limit concentrations (TTLC) and soluble threshold limit concentrations (STLC) for non-RCRA hazardous wastes. The state applies its own leaching procedure, the waste extraction test (WET), which uses a different acid reagent and has a different dilution factor (10-fold). There are other state requirements that may be broader in scope than federal ARARs for identifying non-RCRA wastes regulated by the state. These may be potential ARARs for wastes not covered under federal ARARs. See additional subsections of Cal. Code Regs. tit. 22, § 66261.24. A waste is considered hazardous if its total concentrations exceed the TTLCs or if the extract concentrations from the WET exceed the STLCs.

A WET is required when the total concentrations exceed the STLC but are less than the TTLCs (Cal. Code Regs. tit. 22, div. 4.5, ch. 11, Appendix [app.] II [b]).

1.4.3 Other California Waste Classifications

For waste discharged after July 18, 1997, solid waste classifications at Cal. Code Regs. tit. 27, §§ 20210, 20220, and 20230 are used to determine applicability of waste management requirements. These classifications are summarized below.

A "designated waste" under Cal. Code Regs. tit. 27, § 20210, is defined at California Water Code, § 13173. Under California Water Code, § 13173, designated waste is hazardous waste that has been granted a variance from hazardous waste management requirements or nonhazardous waste that consists of or contains pollutants that, under ambient environmental conditions at a waste management unit, could be released in concentrations exceeding applicable water quality objectives or that could reasonably be expected to affect beneficial uses of the waters of the state.

A nonhazardous solid waste under Cal. Code Regs. tit. 27, § 20220, consists of all putrescible and nonputrescible solid, semisolid, and liquid wastes, including garbage, trash, refuse, paper, rubbish, ashes, industrial wastes, demolition and construction wastes, abandoned vehicles and parts thereof, discarded home and industrial appliances, manure, vegetable or animal solid and semisolid wastes, and other discarded waste (whether of solid or semisolid consistency), provided that such wastes do not contain wastes that must be managed as hazardous wastes or wastes that contain soluble pollutants in concentrations that exceed applicable water quality objectives or could cause degradation of waters of the state.

Under Cal. Code Regs. tit. 27, § 20230, inert waste is that subset of solid waste that does not contain hazardous waste or soluble pollutants at concentrations in excess of applicable water quality objectives and does not contain significant quantities of decomposable waste.

2.0 CHEMICAL-SPECIFIC ARARs

Chemical-specific ARARs are generally health- or risk-based numerical values or methodologies applied to site-specific conditions that result in the establishment of a cleanup level. Many potential ARARs associated with particular response alternatives (such as closure or discharge) can be characterized as action-specific but include numerical values or methodologies to establish them so they fit in both categories (chemical- and action-specific). To simplify the comparison of numerical values, most action-specific requirements that include numerical values are included in this chemical-specific section and, if repeated in the action-specific section, the discussion refers back to this section.

This section presents chemical-specific ARAR determinations for soil. Table A-1 summarizes potential chemical-specific ARARs and TBCs.

2.1 SOIL ARARS

The only soils ARARs that apply to TBB Disposal Site are the RCRA hazardous waste classification requirements. There are no other chemical-specific ARARs for soil.

The key threshold question for soil ARARs is whether or not the wastes located at The TBB Disposal Site would be classified as hazardous waste. The soil may be classified as a federal hazardous waste as defined by RCRA and the state-authorized program, or as non-RCRA, state regulated hazardous waste. If the soil is determined to be hazardous waste, the appropriate requirements will apply.

The federal RCRA requirements at 40 CFR Part 261 do not apply in California because the state RCRA program is authorized. The authorized state RCRA requirements are therefore considered potential federal ARARs. The applicability of RCRA requirements depends on whether the waste is a RCRA hazardous waste; whether the waste was initially treated, stored, or disposed after the effective date of the particular RCRA requirement; and whether the activity at the site constitutes treatment, storage, or disposal as defined by RCRA. However, RCRA requirements may be relevant and appropriate even if they are not applicable. Examples include activities that are similar to the definition of RCRA treatment, storage, or disposal for waste that is similar to RCRA hazardous waste.

The determination of whether a waste is an RCRA hazardous waste can be made by comparing the site waste to the definition of RCRA hazardous waste. The RCRA requirements at Cal. Code Regs., tit. 22, §§ 66261.21, 66261.22(a)(1), 66261.23, 66261.24(a)(1), and 66261.100, are potential ARARs because they define RCRA hazardous waste. A waste can meet the definition of hazardous waste if it has the toxicity characteristic of hazardous waste. This determination is made by using the TCLP. The maximum concentrations allowable for the TCLP listed in § 66261.24(a)(1)(B) are potential federal ARARs for determining whether the site has hazardous waste. If the site waste has concentrations exceeding these values, it is determined to be a characteristic RCRA hazardous waste.

RCRA LDRs at California Code Regulations Title 22, § 66268.1(f), are potential federal ARARs for discharging waste to land. This section prohibits the disposal of hazardous waste to land unless (1) it is treated in accordance with the treatment standards of Cal. Code Regs., tit. 22, § 66268.40, and the underlying hazardous constituents meet the Universal Treatment Standards at Cal. Code Regs., tit. 22, § 66268.48; (2) it is treated to meet the alternative soil treatment standards of Cal. Code Regs., tit. 22, § 66268.49; or (3) a treatability variance is obtained under Cal. Code Regs., tit. 22, § 66268.44. These are potentially applicable federal ARARs because they are part of the state-approved RCRA program. RCRA treatment standards for non-RCRA, state-regulated waste are not potentially applicable federal ARARs but they may be relevant and appropriate state ARARs. The regulations implementing the RCRA LDRs, including applicable LDR treatment standards at Cal. Code Regs., tit. 22 § 66268.7, are also ARARs. Prior to sending any waste off site, the Navy will determine whether the waste is subject to LDRs and will provide the required notices and certifications of § 66268.7.

As long as the excavated material remains inside the area of contamination, it is not considered newly generated waste and will not be subject to RCRA generator, treatment, or other waste management requirements. Should excavated material be moved outside the area of contamination, the substantive RCRA requirements managing hazardous waste (including LDRs) would be applicable.

The Navy identified potential chemical-specific TBCs for lead for human receptors. The EPA Region 9 risk-based PRG for lead in residential soil, 400 mg/kg (EPA 1999), has been accepted by the Navy and DTSC as the cleanup goal for lead concentrations for prior TBB site removal actions and will be used in this removal action.

2.2 GROUNDWATER ARARS

Because groundwater is not a medium of concern for this removal action, there are no chemical-specific ARARs for groundwater.

3.0 LOCATION-SPECIFIC ARARS

This section discusses potential location-specific ARARs based on various attributes of the TBB Disposal Site's location (such as whether it is in a flood plain). Additional surveys will be performed in connection with the response action design and response action to confirm location-specific ARARs where inadequate siting information currently exists, or the event of changes to planned facility locations. The location-specific ARARs applicable to the TBB Disposal Site are the coastal resources, wetlands protection and flood plains management, and biological resources ARARs discussed below.

3.1 COASTAL RESOURCES ARARS

This section discusses federal location-specific ARARs for coastal resources.

The Coastal Zone Management Act (CZMA) (16 USC §§ 1451-1464) specifically excludes federal lands from the coastal zone (16 USC § 1453[l]). Therefore, the CZMA is not potentially applicable to the TBB Disposal Site . The CZMA will be evaluated as a potentially relevant and appropriate requirement. CZMA § 1456(a)(1)(A) requires each federal agency activity within or outside the coastal zone that affects any land or water use or natural resource to conduct its activities in a manner that is consistent to the maximum extent practicable with enforceable policies or approved state management policies. A state coastal zone management program is developed under state law guided by the CZMA and its accompanying implementing regulations in 15 CFR § 930. A state program sets forth objectives, policies, and standards to guide public and private uses of lands and water in the coastal zone.

The BCDC administers the CZMA within the Bay. California's approved coastal management program includes the Bay Plan developed by BCDC. The BCDC was formed under the authority of the McAteer-Petris Act, California Government Code §§ 66600-66682, which authorizes the BCDC to regulate activities within the Bay and the shoreline (100 feet landward from the shoreline) in conformity with the policies of the Bay Plan. The McAteer-Petris Act and the Bay Plan were developed primarily to halt uncontrolled development and filling of the Bay. Their broad goals include reducing Bay fill and disposal of dredged material in the Bay, maintaining marshes and mudflats to the fullest extent possible to conserve wildlife and abate pollution, and protecting the beneficial uses of the Bay.

Non-federal entities must obtain a BCDC permit before placing fill material in the Bay. The permit requirements are not ARARs for the Navy, but the Navy needs to comply with the substantive provisions of the McAteer-Petris Act and the Bay Plan. For example, the McAteer-Petris Act states that filling of the Bay should be authorized only when (1) public benefits from fill clearly exceed public detriment from the loss of the water areas, and (2) no alternative upland location is available. When fill is authorized, the water area to be filled should be the minimum necessary to achieve the purpose of the fill project, the fill should minimize harmful effects to the Bay area, and the fill project must be constructed in accordance with sound safety standards.

All of the TBB Disposal Site alternatives can be implemented in a manner consistent with the goals and substantive requirements of the McAteer-Petris Act and the Bay Plan.

3.2 WETLANDS PROTECTION AND FLOOD PLAINS MANAGEMENT ARARS

This section discusses the federal and state location-specific ARARs for wetlands protection and flood plain management. For habitat restoration, and if any wetlands are destroyed or impaired, the Navy will mitigate and restore wetlands in accordance with the substantive requirements of Executive Order 11990, which is codified at 40 CFR § 6.302(a) and CWA § 404.

Floodplain Management, Executive. Order No. 11988

Under 40 C.F.R. § 6.302(b), federal agencies are required to evaluate the potential effects of action they may take in a floodplain to avoid, to the extent possible, adverse effects associated with direct and indirect development of a floodplain.

The substantive provisions of this section are potential ARARs because the site is located within a floodplain.

Protection of Wetlands, Executive Order No. 11990

Executive Order No. 11990 requires that federal agencies minimize the destruction, loss, or degradation of wetlands; preserve and enhance the natural and beneficial value of wetlands; and avoid support of new construction in wetlands if a practicable alternative exists.

Executive orders themselves are not ARARs, but they constitute TBC guidance that should be followed in any response action. Executive Order No. 11990 is codified at 40 CFR § 6.302(a). The substantive provisions of 40 CFR § 6.302(a) are potential ARARs because the response action may impact wetlands.

Clean Water Act (33 USC § 1344)

CWA § 404 governs the discharge of dredged and fill material into waters of the United States, including adjacent wetlands. Wetlands are areas that are inundated by water frequently enough to support vegetation typically adapted for life in saturated soil conditions. Wetlands include swamps, marshes, bogs, sloughs, potholes, wet meadows, river overflows, mudflats, natural ponds and similar areas. Both the EPA and the U.S. Army Corps of Engineers (USACE) have jurisdiction over wetlands. EPA's § 404 guidelines are promulgated in 40 CFR § 230, and the USACE's guidelines are promulgated in 33 CFR § 320.

The TBB Disposal Site contains wetland areas within its boundaries; therefore, the substantive provisions of Section 404 are potential ARARs.

3.3 BIOLOGICAL RESOURCES ARARS

This section discusses the federal location-specific ARARs for biological resources.

3.3.1 Federal

Endangered Species Act of 1973

The Endangered Species Act (ESA) of 1973 (16 USC §§ 1531–1543) provides a means for conserving various species of fish, wildlife, and plants that are threatened with extinction. The ESA defines an endangered species and provides for the designation of critical habitats. Federal agencies may not jeopardize the continued existence of any listed species or cause the destruction or adverse modification of critical habitat. Under § 7(a) of the ESA, federal agencies must carry out conservation programs for listed species. The Endangered Species Committee may grant an exemption for agency action if reasonable mitigation and enhancement measures such as propagation, transplantation, and habitat acquisition and improvement are implemented. Consultation regulations at 50 CFR § 402 are administrative in nature and are therefore not ARARs. However, they may be TBCs to comply with the substantive provisions of the ESA.

The salt marsh harvest mouse is a federally listed endangered species that could potentially occur at the TBB Disposal Site. Therefore the substantive provisions of the ESA are potential ARARs.

3.3.2 State

The California Department of Fish & Game provided a list of ARARs for Site 30 in a letter dated August 3, 2004. The Navy has determined that of those provided by the Department of Fish & Game, the following requirements are ARARs:

- California Fish and Game Code § 5650(a), (b) & (f): This section prohibits depositing or placing where it can pass into waters of the state any petroleum products, factory refuse, sawdust, shavings, slabs or edgings and any substance deleterious to fish, plant life or bird life.

- California Fish and Game Code § 3005: This section prohibits the taking of birds and mammals, including taking by poison.

- California Fish and Game Code § 2080: This section prohibits the take of any endangered or threatened species.

- California Fish and Game Commission Wetlands Policy: This policy seeks to provide for the protection, preservation, restoration, enhancement and expansion of wetland habitat in California.

- California Fish and Game Code § 4700: This section prohibits the take or possession of listed fully protected mammals or their parts.

- California Fish and Game Code § 3503: This section prohibits the take, possession or needless destruction of the nest or eggs of any bird except as otherwise provided.

- California Fish and Game Code § 3800: This section prohibits the take of non-game birds except in accordance with the regulations of the commission.

- California Fish and Game Code § 8500: This section provides that it unlawful to possess or take, unless otherwise expressly permitted, mollusks, crustaceans, or other invertebrates unless a valid tidal invertebrate permit has been issued.

The Department of Fish & Game also identified the following requirements which the Navy has determined are neither applicable nor relevant and appropriate to Site 30:

- California Fish and Game Code § 1908: This section prohibits the taking of rare or endangered native plants.

- California Fish and Game Code § 3511: This section provides that it is unlawful to take or possess listed fully protected birds.

- California Fish and Game Code § 5050: This section prohibits the take or possession of fully protected reptiles and amphibians.

- California Fish and Game Code § 3503.5: This section prohibits the take, possession, or destruction of any birds in the orders of Falconiformes or Strigifomres (birds of prey) or to take, possess or destroy the nests or eggs of such birds.

- California Fish and Game Code § 4000: This section provides that a fur-bearing mammal may only be taken with a trap, a firearm, bow and arrow, poison under a proper permit, or with the use of dogs.

- California Fish and Game Code § 4150: This section provides that nongame mammals may not be taken or possessed except as otherwise provided.

- California Code of Regulations, Title 14 § 472: This regulation provides that nongame birds and mammals may not be taken except as provided in this section.

- California Code of Regulations, Title 14, section 40: This regulation makes it unlawful to capture, collect, intentionally kill or injure, possess, purchase, propagate, sell, transport, import, or export any native reptile or amphibian, or parts thereof unless a permit has been issued.

- California Code of Regulations, Title 14, section 460: This regulation makes it unlawful to take Fisher, marten, river otter, desert kit fox and red fox.

- California Code of Regulations, Title 14, section 465: This regulation states that fur-bearing mammals may only be taken with a firearm, bow and arrow, or with the use of dogs or traps in accordance with Section 465.5 and Section 3003.1 of the Fish and Game Code.

4.0 ACTION-SPECIFIC ARARS

Potential action-specific ARARs are identified below for the response action alternatives for the TBB Disposal Site.

4.1 NO ACTION WITH MONITORING

There is no need to identify action-specific ARARs for the no-action alternative because ARARs apply only to "any removal or remedial action conducted entirely on-site" and "no action" is not a removal or remedial action (CERCLA Section 121(e), 42 USC § 9621[e]). Cleanup standards for selection of a CERCLA remedy, including the requirement to meet ARARs, are not triggered by the no-action alternative (EPA 1991). Therefore, a discussion of compliance with ARARs is not appropriate for this alternative.

4.2 ALTERNATIVE 2: EXCAVATION, ONSITE DISPOSAL (STABILIZATION), HABITAT RESTORATION, LAND USE CONTROLS

4.2.1 Excavation

The potential federal ARARs for excavation and off-site disposal are RCRA (42 USC § 6901 – 6991[I]), the Federal Hazardous Materials Transportation Law (49 USC § 5101-5127), the Clean Air Act (42 USC § 7401 et seq.), the Clean Water Act (33 USC § 1340 et seq. Each set of ARARs is discussed below.

Resource Conservation and Recovery Act

The key threshold question for soil ARARs is whether or not the wastes excavated from the TBB Disposal Site would be classified as hazardous waste. The soil may be classified as a federal hazardous waste as defined by RCRA and the state-authorized program, or as non-RCRA, state regulated hazardous waste. If the soil is determined to be hazardous waste, appropriate requirements will apply.

The federal RCRA requirements at 40 CFR 261 do not apply in California because the state RCRA program is authorized. The authorized state RCRA requirements are, therefore, considered potential federal ARARs. The applicability of RCRA requirements depends on whether the waste is a RCRA hazardous waste; whether the waste was initially treated, stored, or disposed of after the effective date of the particular RCRA requirement; and whether the activity at the site constitutes treatment, storage, or disposal as defined by RCRA. RCRA requirements may, however, be relevant and appropriate even if they are not applicable. Examples include activities that are similar to the definition of RCRA treatment, storage, or disposal for waste that is similar to RCRA hazardous waste.

Determination of whether a waste is a RCRA hazardous waste can be made by comparing the waste to the definition of RCRA hazardous waste. The RCRA requirements at Cal. Code Regs., tit. 22, §§ 66261.21, 66261.22(a)(1), 66261.23, 66261.24(a)(1), and 66261.100, are potential ARARs because they define RCRA hazardous waste as explained in the chemical-specific ARAR discussion. Cal. Code Regs., tit. 22, §§ 66262.10(a) and 66262.11 require that a person who generates waste must determine if that waste is hazardous. These regulatory sections have been identified as potential action-specific ARARs.

As long as the excavated material remains inside the area of contamination, however, it is not considered newly generated waste and will not be subject to RCRA generator, treatment, or other waste management requirements. If excavated material is moved outside the area of contamination, the substantive RCRA requirements managing hazardous waste would be applicable (including the LDR requirements of Cal. Code Regs., tit. 22 § 66268.1(f)) as referenced under the chemical-specific ARARs discussion in Section 2.0 above).

Any hazardous waste accumulated on site, including waste contained in soil, must comply with the RCRA requirements set forth at Cal. Code Regs., tit. 22, § 66262.34. This section permits on-site hazardous waste accumulation for up to 90 days as long as the waste is properly stored

and labeled. For hazardous waste sent off site for disposal, the RCRA pretransport regulations at Cal. Code Regs., tit. 22, §§ 66262.30 (packaging), 66262.31 (labeling), 66262.32 (marking), and 66262.33 (placarding), and RCRA manifest requirements at Cal. Code Regs., tit. 22, §§ 66262.20, 66262.21, 66252.22, and 66262.23 are applicable.

Federal Hazardous Materials Transportation Law

The Federal Hazardous Materials Transportation Law, 49 USC §§ 5101-5127, 49 CFR §§ 171.2(f), 171.2(g), 172.300, 172.301, 172.302, 172.303172.304, 172.312, 172.400, and 172.504, are relevant and appropriate requirements for transporting hazardous waste. These regulatory sections consist of requirements for transporting hazardous wastes, including representations that containers are safe, prohibitions on altering labels, marking requirements, labeling requirements, and placarding requirements. The substantive provisions of these requirements are potential ARARs.

Clean Air Act

The following Bay Area Air Quality Management District (BAAQMD) regulations are potential ARARs for excavation:

- Regulation 6-302: Opacity Limitation (prohibiting emissions for a period aggregating more than 3 minutes in any hour to greater than or equal to 20 percent opacity)
- Regulation 6-305: Visible Particles (prohibiting the emissions of particles in sufficient number to cause annoyance)
- Regulation 8, Rule 40: Aeration of Contaminated Soil and Removal of Underground Storage Tanks (setting forth standards for maintaining, covering, and stockpiling soil)

Clean Water Act

SWRCB Order 99-08 is the state of California General Permit for Discharge of Stormwater Associated with Construction Activities, issued pursuant to 40 CFR 122 Subpart C. The substantive permit requirements are the use of best management practices to prevent construction pollutants from contacting storm water and to keep erosions products from moving off site. During excavation, best management practices would be used to prevent construction pollutants from contacting storm water and to minimize erosional products from moving off site in accordance with SWRCB Order 99-08.

4.2.2 Confirmation Sampling

There are no ARARs for the confirmations sampling planned as part of this alternative.

4.2.3 On-Site Disposal

There are no ARARs for the on-site disposal other than the RCRA land disposal restriction described in Section 4.2.1 and in the chemical-specific discussion.

4.2.4 Land Use Controls

There are no federal ARARs for institutional controls.

State statutes that have been accepted by the Navy as ARARs for implementing institutional controls and entering into an Environmental Restriction Covenant and Agreement with DTSC include substantive provisions of the Cal. Civ. Code § 1471 and Cal. Health & Safety Code §§ 25202.5, 25222.1, 25233(c), 25234, and 25355.5. DTSC promulgated a regulation on 19 April 2003 regarding "Requirements for Land Use Covenants" at Cal. Code Regs. tit. 22, § 67391.1. The substantive provisions of this regulation have been determined to be "relevant and appropriate" state ARARs by the Navy.

The substantive provisions of Cal. Civ. Code § 1471 are the following general narrative standard: ". . . to do or refrain from doing some act on his or her own land . . . where . . . : (c) Each such act relates to the use of land and each such act is reasonably necessary to protect present or future human health or safety or the environment as a result of the presence on the land of hazardous materials, as defined in Section 25260 of the Health and Safety Code." This narrative standard would be implemented through incorporation of restrictive environmental covenants in the deed at the time of transfer. These covenants would be recorded with the environmental restriction covenant and agreement and run with the land.

The substantive provisions of Cal. Health & Safety Code § 25202.5 are the general narrative standard to restrict "present and future uses of all or part of the land on which the . . . facility . . . is located . . . ." These substantive provisions will be implemented by incorporation of restrictive environmental covenants in the Environmental Restriction Covenant and Agreement at the time of transfer for purposes of protecting present and future public health and safety.

Cal. Health & Safety Code §§ 25222.1 and 25355.5(a)(1)(C) provide the authority for the state to enter into voluntary agreements to establish land-use covenants with the owner of property. The substantive requirements of the following Cal. Health & Safety Code § 25222.1 provisions are "relevant and appropriate": (1) the general narrative standard: "restricting specified uses of the property,..." and (2) "…the agreement is irrevocable, and shall be recorded by the owner, …as a hazardous waste easement, covenant, restriction or servitude, or any combination thereof, as appropriate, upon the present and future uses of the land." The substantive requirements of the following Cal. Health & Safety Code § 25355.5(a)(1)(C) provisions are "relevant and appropriate": "…execution and recording of a written instrument that imposes an easement, covenant, restriction, or servitude, or combination thereof, as appropriate, upon the present and future uses of the land."

The Navy will comply with the substantive requirements of Cal. Health & Safety Code §§ 25222.1 and 25355.5(a)(1)(C) by incorporating the CERCLA use into the Navy's deed of conveyance in the form of restrictive covenants under the authority of Cal. Civ. Code § 1471 and into the environmental restriction covenant and agreement. The substantive provisions of Cal. Health & Safety Code §§ 25222.1 and 25355.5(a)(1)(C) may be interpreted in a manner that is consistent with the substantive provisions of Cal. Civ. Code § 1471. The covenants shall be recorded with the deed and run with the land.

Cal. Health & Safety Code § 25233(c) sets forth "relevant and appropriate" substantive criteria for granting variances from prohibited uses based upon specified environmental and health criteria. Cal. Health & Safety Code § 25234 sets forth the following "relevant and appropriate" substantive criteria for the removal of a land-use restriction on the grounds that "…the waste no longer creates a significant existing or potential hazard to present or future public health or safety."

In addition to being implemented through the Environmental Restriction Covenant and Agreement between the Navy and DTSC, the appropriate and relevant portions of Cal. Health & Safety Code §§ 25202.5, 25222.1, 25233(c), 25234, and 25355.5(a)(1)(C) and Cal. Civ. Code § 1471 shall also be implemented through the deed between the Navy and the transferee.

U.S. EPA does not agree with the Navy and DTSC that the sections of the Cal. Civ. Code and Cal. Health & Safety Code cited above are ARARs because they fail to meet the criteria for ARARs pursuant to U.S. EPA guidance (i.e., they are administrative, not substantive, requirements that establish a discretionary way to implement land-use restrictions). However, U.S. EPA agrees that the substantive provisions of the recently promulgated regulation (Cal. Code Regs. tit. 22, § 67391.1) providing for the execution of a land-use covenant between the Navy and DTSC is a "relevant and appropriate" state ARAR.

Title 22 CCR 67391.1 provides that the DTSC shall not approve or concur in a response action decision document that includes LUCs unless the controls are clearly set forth and defined in the decision document. This section also states, among other requirements that DTSC shall not consider property owned by the federal government to be suitable for transfer to nonfederal entities where hazardous materials, hazardous wastes or constituents, or hazardous substances remain at the property at levels that are not suitable for unrestricted use without an LUC. The Navy has identified the substantive provisions of this section as potential ARARs.

4.2.5 Habitat Restoration

There are no action-specific ARARs for habitat restoration. Habitat restoration will be conducted in accordance with the location-specific ARARs identified above.

4.3 ALTERNATIVE 3: EXCAVATION, CONFIRMATION SAMPLING, OFF-SITE DISPOSAL, AND SITE RESTORATION

4.3.1 Excavation and Off-Site Disposal

The same ARARs identified for excavation for Alternative 2 apply to the excavation and off-site disposal for Alternative 3.

4.3.2 Habitat Restoration

There are no action-specific ARARs for habitat restoration. Habitat restoration will be conducted in accordance with the location-specific ARARs identified above

REFERENCES

U.S. Environmental Protection Agency (EPA). 1986. "Guidelines for Groundwater Classification Under the EPA Groundwater Protection Strategy."

EPA. 1988a. "CERCLA Compliance With Other Laws Manual, Draft Guidance." Office of Emergency and Remedial Response. EPA/540/G-89/006. Washington, DC. August.

EPA 1991a. "Management of Investigation-Derived Wastes During Site Inspections." EPA/540/G-91/009. May.

APPENDIX B
DETAILED COST ESTIMATES

CONTENTS

TABLES

1.0 INTRODUCTION

The following text describes each alternative and its associated components and the assumptions used to develop the cost estimate for Site 30, the Taylor Boulevard Bridge (TBB) Disposal Site at Naval Weapons Station Seal Beach Detachment Concord in Concord, California. After the text are the backup spreadsheets and specific assumptions used to estimate the costs associated with each alternative proposed for cleanup at Site 30, the TBB Disposal Site.

2.0 PURPOSE OF ESTIMATES

Cost estimates developed during the detailed analysis phase are used to compare alternatives and support remedy selection. The National Oil and Hazardous Substances Pollution Contingency Plan (NCP) includes the following language in its description of the cost criterion for the detailed analysis and remedy selection:

> "The types of costs that shall be assessed include the following: (1) Capital costs, including both direct and indirect costs; (2) Annual operations and maintenance costs; and (3) Net present value of capital and O&M [operations and maintenance] costs (40CFR [Code of Federal Regulations] 300.430 (e)(9)(iii)(G))" (EPA 2000)

3.0 TYPES OF COST ESTIMATING METHODS

The cost estimates presented in this appendix were developed using both detailed and parametric approaches, both of which are accepted by the U.S. Environmental Protection Agency (EPA), as described below:

The detailed approach estimates cost on an item-by-item basis. Detailed methods typically rely on compiled sources of unit cost data for each item, taken from either a built-in database (if part of a software package, for example) or from other sources (for example, cost estimating references). This method, also known as "bottom up" estimating, is used when design information is available.

The parametric approach relies on relationships between cost and design parameters. These relationships are usually statistically or model-based. Statistically based approaches rely on scaled-up or scaled-down versions of projects where historical cost data are available. Model-based approaches use a generic design linked to a cost database and adjusted for site-specific information. This method, also know as "top down" estimating, is used when design information is not available (EPA 2000).

4.0 METHODOLOGY

The Remedial Action Cost Engineering and Requirements System (RACER) 2004 was the primary source of cost data (Earth Tech 2004). Costs for unique line items not included in RACER were based on vender quotes. Excel spreadsheets were used to tabulate costs and

calculate net present values (NPV) in 2004 dollars; RACER outputs are presented in 2004 dollars.

4.1. DESCRIPTION OF RACER™

RACER is a cost estimating tool that estimates costs for all phases of remediation (Earth Tech 2004). RACER can be used to evaluate costs for interim studies and measures, remedial design and corrective measures, remedial and corrective action, operations and maintenance (O&M), long-term monitoring, and site closeout. The system was originally developed in 1991 under U.S. Department of the Air Force funding. Numerous revisions and updates have been incorporated through several releases since RACER was introduced.

RACER is a parametric cost modeling system that uses a patented methodology for estimating costs. The RACER cost database is a duplicate of the Environmental Cost Handling Options and Solutions (ECHOS) cost database, which was published by the R.S. Means Company. RACER cost estimates are based on generic engineering solutions for environmental projects, technologies, and processes. Historical project information, industry data, government laboratories, construction management agencies, vendors, contractors, and engineering analysis were used to develop generic solutions to engineering problems. Cost estimates in RACER are tailored specifically to each project by adding site-specific parameters to reflect project-specific conditions and requirements. The tailored design is then translated into specific quantities of work, and the quantities of work are priced using current price data.

4.2. USER-DEFINED COSTS

It was not always possible to develop RACER cost estimates because of unique characteristics for some elements of the remediation alternatives. The costs of these elements were therefore estimated using vendor quotes and were evaluated and adjusted as necessary to account for inflation.

5.0 COMPONENTS OF COST ESTIMATE

Cost estimates for the remediation alternatives include capital costs, annual O&M or periodic costs, cost of capital, NPV of O&M or periodic costs, contingency allowances, and escalation costs for dated data. Each of these factors is discussed in further detail in the following text.

5.1 CAPITAL COSTS

Capital costs include direct and indirect costs. Costs incurred for equipment, material, labor, construction, development, and implementation of remedial technologies are included as direct costs. Indirect costs include health and safety, site supervision, engineering, overhead and profit, and startup. Indirect costs are included in the estimate as either a separate line item or as a percentage of the direct capital cost.

5.2 ANNUAL OPERATION AND MAINTENANCE AND/OR PERIODIC COSTS

Annual O&M costs include costs incurred after construction. These costs are necessary to assure that a remedial action is effective. Annual O&M costs typically include power, operating labor, consumable materials, purchased services (for example, laboratory analysis), equipment replacement, maintenance, sampling, permit fees, annual reports, and site reviews.

Periodic costs occur once every few years or once during the entire O&M period. Examples include 5-year reviews, equipment replacement, site closeout, and remedy failure and replacement.

5.3 PRESENT VALUE ANALYSIS

Remedial action projects typically involve construction costs that are expended at the beginning of a project (capital costs) and costs in subsequent years (operation and maintenance or periodic costs). Present value (PV) analysis is a method to evaluate expenditures that occur over different periods of time. This standard methodology allows for cost comparisons of different remedial alternatives on the basis of a single figure for each alternative. This single value, referred to as the present value, is the amount needed to be set aside at the initial point in time (base year) to assure that funds will be available in the future as they are needed. PV analysis uses a discount rate and period of analysis to calculate the PV of each expenditure.

5.3.1 Discount Rate

A discount rate is similar to an interest rate and is used to account for the time value of money. A dollar is worth more today than in the future because, if invested in an alternative use today, the dollar would earn interest. If the capital were not employed in a specific use, it would have a productivity value in alternate uses. The choice of a discount rate is important because the rate selected directly affects the present value of a cost estimate, which is then used in making a decision on remedy selection.

EPA policy on the use of discount rates for cost analysis is stated in the preamble to the NCP (55FR8722) and in Office of Solid Waste and Emergency Response (OSWER) Directive 9355.3-20 (EPA 1993). Discount rates used in economic analysis by the federal government are specified in the Office of Management and Budget (OMB) Circular A-94. The current discount rate for a 30-year stream of payments is 3.5 percent (OMB 1993).

5.3.2 Present Value

The PV of a series of equal annual future payments such as annual O&M payments is calculated using the following equation:

$$PV = \sum_{t=1}^{n} \frac{x_t}{(1+i)^t}$$

where

PV	=	Present value
x_t	=	Payment in year t (t = 0 for present or base year)
i	=	Discount factor
t	=	Number of years following construction that expenditure start
n	=	Number of years that the stream of equal annual future payments will run

The present value of a single periodic future payment is calculated using the following equation:

$$PV = \frac{x_t}{(1+i)^t}$$

where

PV	=	Present value
x_t	=	Payment in year t (t = 0 for present or base year)
i	=	Discount factor
t	=	Number of years following construction that expenditure occur

The PV of a remedial alternative represents the sum of the present values of all future payments associated with the project. PV for this cost estimate is calculated using 2004 dollars.

5.3 CONTINGENCY ALLOWANCES

Contingency is factored into a cost estimate to cover unknown factors, unforeseen circumstances, or unanticipated conditions that are not possible to evaluate from the data on hand at the time the estimate is prepared. The two main types of contingency are scope and bid. Scope contingency covers unknown costs that could result from changes in the scope that may occur during design. Bid contingency covers unknown costs associated with constructing or implementing a given project scope.

5.4 ESCALATION COSTS

Escalation costs reflect the increase in project costs over time as a result of inflation. The costs do not need to be escalated because RACER output costs are expressed in 2004 dollars (Earth Tech 2004).

6.0 INDIVIDUAL COST ESTIMATE ASSUMPTIONS

This section identifies the assumptions and parameters used in developing cost estimates for remediation at Site 30. Tables B-1 through B-3 present the total remedial costs for each alternative at Site 30. A summary of the costs for all the alternatives is presented in Table B-4.

6.1 COST AND ASSUMPTIONS ASSOCIATED WITH ALTERNATIVE 1: NO ACTION WITH MONITORING

The no action alternative is retained through the EE/CA process as required by the NCP (40 CFR 300.430[e][6]) to provide a comparative baseline that can be used to evaluate all alternatives. Costs associated with this alternative are presented in Table B-1.

This alternative includes monitoring groundwater for 30 years

6.1.1 Assumptions

Assumptions made are provided in the following list:

- **Biological Survey**
  - A biological survey will be conducted in the first year to evaluate whether habitat for the pickleweed and salt marsh harvest mouse is affected.
- **Monitoring**
  - Three groundwater samples will be collected quarterly in the first year and annually thereafter, using pumps, for 30 years from a depth of 10 feet below ground surface (bgs) and will be analyzed for lead, chromium, copper, iron, mercury, selenium, zinc, benzo(a)pyrene, benzo(b)fluoranthene, and polychlorinated biphenyls (PCBs). Quality control samples will be collected at a frequency of 10 percent of the total number of samples.
  - The wells will be abandoned, and a close-out report will be written at the end of 30 years.

6.2 COST AND ASSUMPTIONS ASSOCIATED WITH ALTERNATIVE 2: EXCAVATION, CONFIRMATION SAMPLING, ON-SITE DISPOSAL, LAND USE CONTROLS (LUCS), AND HABITAT RESTORATION.

This section provides the assumptions used in the costs for Alternative 2. The proposed remedial alternatives are summarized in Section 4.0 of the main engineering evaluation and cost analysis (EE/CA) text; detailed descriptions and analyses of the alternatives are presented in Section 4.6. Costs associated with this alternative are presented in Table B-2.

6.2.1 Assumptions

The general assumptions used for Alternative 2are listed as follows:

- **Mobilization**
  - Underground utilities will be located.
  - Heavy equipment will be mobilized.
  - Truck scales will be rented.
  - Baseline data will be collected using data from Site 1.
  - A health and safety program will be in place before any construction begins.
- **Haul Road Construction**
  - The haul road will be 7,000 feet long (extending from the existing road to beneath the TBB), one lane, crown section, dirt, with one temporary railroad crossing (to be completed by the railroad company). Approximately 4,000 linear feet of the road is already suitable for hauling; this section will not be further developed.
  - The roadbed will be 12 feet wide; shoulders will be 3 feet wide on either side of the road.
  - Subgrade will be 18 inches thick.
  - The roadway will need to be cleared of light brush and trees for construction.
  - Soil type is a silt/silty-clay mixture.
  - No stabilization will be required; no base material will be needed in construction of the haul road.
- **Preliminary Site Construction Work**
  - A 6-foot tall mouse-proof fence (wood) will be constructed along the east side of the debris excavation area (approximately 300 linear feet) to protect the salt marsh harvest mouse (SMHM). Mice will be trapped and removed before construction begins. A biological monitor will be on site to ensure that work does not harm the the SMHM.
  - An 8-foot high Aqua-Barriers with patented anti-roll internal baffle system will be installed. The barrier will be approximately 600 feet long and will be capable of

controlling up to 6 feet of standing water and sediment. A vendor quote was obtained from Hydro Solutions, Inc.

- Two of the three monitoring wells within the footprint of the excavation will be destroyed before excavation begins. The easternmost well will be protected during excavation.
- An area approximately 13,000 square feet will be excavated to 9 feet bgs and located northeast and adjacent to the current debris area. This area will be for soil disposal. Soil excavated from this area will be stockpiled for possible reuse as topsoil over the soil debris, or for reconstruction of the wetland habitat if found suitable. Soil will be sampled and analyzed for metals, semivolatile organic compounds (SVOCs), total organic compound (TOC), and particle size distribution to evaluate its suitability.
- A staging area, located adjacent to and east of the debris area, will be cleared for equipment storage.
- Load distribution mats will be in place over 10 percent of the wetlands area to reduce damage to geology from heavy equipment working on soft soils. Equipment will use vegetable-based oils to prevent further contamination. Heavy equipment will be decontaminated.

- **Excavation**
  - The contaminated soil excavation area is approximately 31,975 square feet and 3 feet deep.
  - There is no rock that will require blasting or ripping.
  - There are no drums that need to be removed.
  - Soil is a sand-silt/sand-clay mixture.
  - Dewatering will be required throughout the excavation process.
  - No ground penetrating radar will be used.
  - Excavation will take place on a grid, with approximately 30 squares of 35 feet by 35 feet included in the grid. Fifty confirmatory samples will be collected and analyzed for lead.
  - The excavated volume will be approximately 4,600 cubic yards (assuming the bulking factor is 1.3).
  - All backfill will come from excavation of the soil disposal area (if deemed suitable for backfill) or from off site. This cost estimate assumed that soil from the disposal area will be suitable for backfill.
  - The existing cover is soil/gravel; the replacement cover will be soil/gravel.
  - A 12 cubic yard (yd^3) dump truck with operator will be on site for 2 months (40 days), 10 hours per day to carry the excavated soil to the soil disposal area.
  - A plastic laminate waste pile cover will be used to cap the stockpiled material; the cover will be approximate 1/10 acre and will not include a passive gas vent system.

  - Topsoil, soil cover, and leveling layer will all come from an on-site source. Soil cover will be 12 inches thick and leveling layer will be 6 inches thick.

- Stablization
  - Approximately 4,600 yd^3 of soil and debris will be stabilized in the soil disposal area.
  - The soil and debris have average density of 100 pounds per cubic foot.
  - A mobile, 15-cubic-yard stabilization unit will be used.
  - Initial moisture content of the waste will be 15 percent, and it will take 20 minutes to mix each batch.
  - The cement to waste ratio will be 0.150:1, the water to cement ratio will be 0.400:1, and proprietary chemicals will be used at 0.010:1 (chemical to waste). The total waste disposal volume will be approximately 5,900 cubic yards.

- **Backfill**
  - Wetland compactable soil will be used to backfill and restore the wetlands area. If found suitable, soil from excavation of the soil disposal area will be used as backfill. The fill be compacted and tested.

- **Wetlands Restoration**
  - The wetland area will be graded to support the pickleweed habitat. A sediment control fence will be installed along the eastern border of the wetland area to help prevent erosion of the pickleweed habitat.
  - New pickleweed will be planted at the site because pickleweed from the debris area may hold contaminated soil to its roots. Pickleweed will be harvested in a greenhouse and should be planted in the spring. Plants will be planted on 2-foot centers covering the 32,000-square-foot area. A vendor quote was obtained from Pacific OpenSpace, Inc.

- **Post-construction Activity**
  - Temporary railroad and ditch crossings will be removed, equipment will be demobilized, and general site cleanup will occur.

- **Biological Survey**
  - A biological survey will be conducted annually for 3 years to ensure the habitat for the pickleweed and salt marsh harvest mouse is protected.

- **Land Use Controls**
  - Land use controls will be in place indefinitely to prohibit residential or commercial use of the site unless the site is deemed suitable for these uses.

6.3 COST AND ASSUMPTIONS ASSOCIATED WITH ALTERNATIVE 3: EXCAVATION, CONFIRMATION SAMPLING, OFF-SITE DISPOSAL, AND HABITAT RESTORATION

This section provides the assumptions used in preparing the costs for Alternative 3. The proposed remedial alternatives are summarized in Section 4.0 of the main EE/CA text, and detailed descriptions and analyses of the alternatives are presented in Section 4.7. Costs associated with this alternative are presented in Table B-3.

6.2.1 Assumptions

The general assumptions used for Alternative 3 are listed as follows:

- **Mobilization**
  - Underground utilities will be located.
  - Heavy equipment will be mobilized.
  - Truck scales will be rented.
  - Baseline data will be collected using data from Site 1.
  - A health and safety program will be in place before any construction begins.
- **Haul Road Construction**
  - The haul road will be 7,000 feet long (extending from the existing road to beneath the TBB), one lane, crown section, dirt, with one temporary railroad crossing (to be completed by the railroad company). Approximately 4,000 linear feet of the road is already suitable for hauling; this section will not be further developed.
  - The roadbed will be 12 feet wide; shoulders will be 3 feet wide on either side of the road.
  - Subgrade will be 18 inches thick
  - The roadway will need to be cleared of light brush and trees for construction.
  - Soil type is silt/silty-clay mixture.
  - No stabilization will be required; no base material will be needed in construction of the haul road.
- **Preliminary Site Construction Work**
  - A 6 feet tall mouse-proof fence (wood) will be constructed along the eastern side of the debris excavation area (approximately 300 linear feet) to protect the SMHM. Mice will be trapped and removed before construction begins. A biological monitor will be on site to ensure work does not harm the SMHM.
  - An 8-foot high Aqua-Barriers fence with patented anti-roll internal baffle system will be installed. The barrier will be approximately 600 feet long and will be capable of controlling up to 6 feet of standing water and sediment. A vendor quote was obtained from Hydro Solutions, Inc.

- Two of the three monitoring wells within the footprint of the excavation will be destroyed before excavation begins. The easternmost well will be protected during excavation.
- A staging area, located adjacent and east of the debris area, will be cleared for equipment storage.
- Load distribution mats will be in place over 10 percent of the wetlands area to reduce damage to geology from heavy equipment working on soft soils. Equipment will use vegetable-based oils to prevent further contamination. Heavy equipment will be decontaminated.

- **Excavation**
  - The contaminated soil excavation area is approximately 31,975 square feet and 3 feet deep.
  - There is no rock requiring blasting or ripping.
  - There are no drums that need to be removed.
  - Soil is a sand-silt/sand-clay mixture.
  - Dewatering will be required throughout the excavation process.
  - No ground penetrating radar will be used.
  - Excavation will take place on a grid, with approximately 30 squares of 35 feet by 35 feet included in the grid. Fifty confirmatory samples will be collected and analyzed for lead, one sample will be analyzed for toxicity characteristic leaching procedure (TCLP) to evaluate the acceptability of the waste at a landfill.
  - The excavated volume will be approximately 4,600 yd^3 (assuming the bulking factor is 1.3).
  - None of the soil excavated will be used as backfill; all backfill will come from off site.
  - The existing cover is soil/gravel, the replacement cover will be soil/gravel.
  - A 12 yd^3 dump truck with operator will be on site for 2 months (40 days), 10 hours per day to carry the excavated soil to the soil disposal area.
  - A plastic laminate waster pile cover will be used to cap the stockpiled material; the cover will be approximate 1/10 acre and will not include a passive gas vent system.

- **Haul**
  - Excavated soil from the debris area will be collected at a debris stockpile and hauled to an appropriate landfill. About 70 percent of the excavated material will be hauled to a Class I landfill, and 30 percent will be hauled to a Class II landfill.
  - A vendor quote was obtained for hauling and disposal. The cost will be $55 per ton for disposal to a Class II facility, $80 per ton for disposal to a Class I facility provided waste does not require stabilization, and $190 for disposal of waste that requires stabilization at a Class I facility. The quote includes transportation and

disposal and associated taxes. The quote was obtained on October 12, 2004, from Stuart Levang, operations manager at DenBeste Transportation, Inc., 820 DenBeste Court, Windsor, California 95492, (800) 838-1477.

- **Backfill**
  - Wetland compactable soil will be used to backfill and restore the wetlands area. If found suitable, soil from excavation of the soil disposal area will be used as backfill. The fill be compacted and tested.
- **Wetlands Restoration**
  - The wetland area will be graded to support the pickleweed habitat. A sediment control fence will be installed along the eastern border of the wetland area to help prevent erosion of the pickleweed habitat.
  - New pickleweed will be planted at the site because pickleweed from the debris area may hold contaminated soil to its roots. Pickleweed will be harvested in a greenhouse and should be planted in the spring. Plants will be planted on 2-foot centers covering the 32,000-square-foot area. A vendor quote was obtained from Pacific OpenSpace, Inc.
- **Post-construction Activity**
  - Temporary railroad and ditch crossings will be removed, equipment will be demobilized, and general site cleanup will occur.
- **Biological Survey**
  - A biological survey will be conducted annually for 3 years to ensure the habitat for the pickleweed and salt marsh harvest mouse is protected.

REFERENCES

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TABLE B-1 ALTERNATIVE 1 (MONITORING), TOTAL REMEDIAL COST SUMMARY
Engineering Evaluation/Cost Analysis, Site 30, Taylor Boulevard Bridge, Naval Weapons Station Seal Beach Detachment Concord, CA

COST ESTIMATE SUMMARY

Site: Site 30, Taylor Boulevard Bridge
Location: Naval Weapons Station Seal Beach Detachment Concord, CA
Phase: Engineering Evaluation/Cost Analysis
Base Year: 2004
Date: September 2004

Description: Biological monitoring and groundwater motioring in the first year, groundwater monitoring until year 30.

DESCRIPTION	Quantity	Unit of Measure	Material Unit Cost	Labor Unit Cost	Equipment Unit Cost	Extended Cost	Notes
CAPITAL COSTS:							
Annual Groundwater Monitoring							Three samples will be collected
Disposable Materials per Sample	14.00	EA	12.47	0.00	0.00	$175	quarterly from 10 ft bgs (plus QC)
Decontamination Materials per Sample	14.00	EA	11.13	0.00	0.00	$156	
Nylon Tubing, 1/4" Outside Diameter	145.00	LF	0.65	0.00	0.00	$94	
Water Quality Parameter Testing Device, DO, Temp., pH, Conductivity, Salinity, Turbidity, Daily Rent	4.00	DAY	102.24	0.00	0.00	$409	
Total Dissolved Solids (EPA 160.1), Water Analysis	14.00	EA	25.69	0.00	0.00	$360	
Total Suspended Solids (EPA 160.2), Water Analysis	14.00	EA	25.69	0.00	0.00	$360	
Pesticides/PCBs (EPA 608), Water Analysis	14.00	EA	255.60	0.00	0.00	$3,578	
TAL Metals (EPA 6010/7000s), Water, Water Analysis	14.00	EA	200.00	0.00	0.00	$2,800	
Polynuclear Aromatic Hydrocarbons, PAH (EPA 610)	14.00	EA	178.92	0.00	0.00	$2,505	
4" Submersible Pump Rental, Day	4.00	DAY	112.62	0.00	0.00	$450	
Well Development Equipment Rental (Daily)	4.00	DAY	211.81	0.00	0.00	$847	
SUBTOTAL ($2004)						**$11,734**	
Annual General Monitoring							
Car or Van Mileage Charge	500.00	MI	0.53	0.00	0.00	$265	
Project Manager	4.00	HR	0.00	128.05	0.00	$512	
Project Engineer	30.00	HR	0.00	112.30	0.00	$3,369	
Project Scientist	101.00	HR	0.00	71.81	0.00	$7,253	
Staff Scientist	65.00	HR	0.00	66.93	0.00	$4,350	
Field Technician	75.00	HR	0.00	89.51	0.00	$6,713	Biological monitor and sampling
Word Processing/Clerical	30.00	HR	0.00	45.19	0.00	$1,356	
Draftsman/CADD	26.00	HR	0.00	82.85	0.00	$2,154	
SUBTOTAL ($2004)						**$25,972**	
SUBTOTAL ($2004)						$37,706	
Contingency		25%				$9,426	10% scope + 15% bid
SUBTOTAL ($2004)						**$47,132**	

TABLE B-1 ALTERNATIVE 1 (MONITORING), TOTAL REMEDIAL COST SUMMARY
Engineering Evaluation/Cost Analysis, Site 30, Taylor Boulevard Bridge, Naval Weapons Station Seal Beach Detachment Concord, CA

COST ESTIMATE SUMMARY

Site: Site 30, Taylor Boulevard Bridge
Location: Naval Weapons Station Seal Beach Detachment Concord, CA
Phase: Engineering Evaluation/Cost Analysis
Base Year: 2004
Date: September 2004

Description: Biological monitoring and groundwater motioring in the first year, groundwater monitoring until year 30.

DESCRIPTION	Quantity	Unit of Measure	Material Unit Cost	Labor Unit Cost	Equipment Unit Cost	Extended Cost	Notes
Professional Labor							
Design and Work Plan		3.00%				$1,414	
Project Management Labor Cost		1.00%				$471	
Planning Documents Labor Cost		2.00%				$943	
Reporting Labor Cost		0.75%				$353	
Public Notice Labor Cost		0.25%				$118	
Site Closure Activities Labor Cost		0.25%				$118	
Permitting Labor Cost		1.00%				$471	
SUBTOTAL ($2004)						**$3,888**	
TOTAL CAPITAL COST IN 2004 DOLLARS						$51,021	
OPERATIONS AND MAINTENANCE COSTS:							
Groundwater Monitoring							Three samples will be collected
Disposable Materials per Sample	4.00	EA	12.47	0.00	0.00	$50	annually from 10 ft bgs (plus QC)
Decontamination Materials per Sample	4.00	EA	11.13	0.00	0.00	$45	
Nylon Tubing, 1/4" Outside Diameter	40.00	LF	0.65	0.00	0.00	$26	
Water Quality Parameter Testing Device, DO, Temp., pH, Conductivity, Salinity, Turbidity, Daily Rent	4.00	DAY	102.24	0.00	0.00	$409	
Total Dissolved Solids (EPA 160.1), Water Analysis	4.00	EA	25.69	0.00	0.00	$103	
Total Suspended Solids (EPA 160.2), Water Analysis	4.00	EA	25.69	0.00	0.00	$103	
Pesticides/PCBs (EPA 608), Water Analysis	4.00	EA	255.60	0.00	0.00	$1,022	
TAL Metals (EPA 6010/7000s), Water, Water Analysis	4.00	EA	200.00	0.00	0.00	$800	
Polynuclear Aromatic Hydrocarbons, PAH (EPA 610)	4.00	EA	178.92	0.00	0.00	$716	
4" Submersible Pump Rental, Day	1.00	DAY	112.62	0.00	0.00	$113	
Well Development Equipment Rental (Daily)	1.00	DAY	211.81	0.00	0.00	$212	
SUBTOTAL ($2004)						**$3,597**	
General Monitoring							
Car or Van Mileage Charge	100.00	MI	0.53	0.00	0.00	$53	
Project Manager	4.00	HR	0.00	128.05	0.00	$512	
Project Engineer	16.00	HR	0.00	112.30	0.00	$1,797	
Project Scientist	40.00	HR	0.00	71.81	0.00	$2,872	
Staff Scientist	35.00	HR	0.00	66.93	0.00	$2,342	
Field Technician	20.00	HR	0.00	89.51	0.00	$1,790	
Word Processing/Clerical	7.00	HR	0.00	45.19	0.00	$316	
Draftsman/CADD	7.00	HR	0.00	82.85	0.00	$580	
SUBTOTAL ($2004)						**$10,263**	
TOTAL O&M COST IN 2004 DOLLARS						**$13,861**	

TABLE B-1 ALTERNATIVE 1 (MONITORING), TOTAL REMEDIAL COST SUMMARY
Engineering Evaluation/Cost Analysis, Site 30, Taylor Boulevard Bridge, Naval Weapons Station Seal Beach Detachment Concord, CA

COST ESTIMATE SUMMARY

Site: Site 30, Taylor Boulevard Bridge
Location: Naval Weapons Station Seal Beach Detachment Concord, CA
Phase: Engineering Evaluation/Cost Analysis
Base Year: 2004
Date: September 2004

Description: Biological monitoring and groundwater motioring in the first year, groundwater monitoring until year 30.

DESCRIPTION		Quantity	Unit of Measure	Material Unit Cost	Labor Unit Cost	Equipment Unit Cost	Extended Cost	Notes
PERIODIC COSTS:								
Close-out Report	30	1	EA		$47,929		$47,929	
SUBTOTAL ($2004)							**$47,929**	

PRESENT VALUE ANALYSES:

Cost Type	Year	Total Cost	Total Cost per Year	Discount Factor[a,b]	Present Value	Notes
Capital Cost	0	$51,021	$51,021	1.0000	$51,021	
Annual O&M	1-30	$415,819	$13,861	18.3920	$254,926	
Periodic Cost	30	$47,929	$47,929	0.3563	$17,076	
		$514,769			**$323,022**	

TOTAL PRESENT VALUE OF ALTERNATIVE **$323,022**

Notes:
Labor rates are based on STAECRU contract

[a] Discount factor = $\frac{1}{(1+i)^t}$ where i = 0.035 for a 30 year technology and t = year (i.e., the present value of the dollar paid in year t at 3.5%)

[b] Multi-year discount factor = $\frac{(1+i)^n - 1}{i(1+i)^n}$ where i = 0.035 for a 30 year technology, t = year, and n = total number of years (i.e., the present value of the dollar paid per year from year 1 to year n at 3.5%)

TABLE B-2 ALTERNATIVE 2 (EXCAVATION,CONFIRMATION SAMPLING,ON-SITE DISPOSAL,LUCS, HABITAT RESTORATION), TOTAL REMEDIAL COST SUMMARY

Engineering Evaluation/Cost Analysis, Site 30, Taylor Boulevard Bridge, Naval Weapons Station Seal Beach Detachment Concord, CA

COST ESTIMATE SUMMARY

Site: Site 30, Taylor Boulevard Bridge
Location: Naval Weapons Station Seal Beach Detachment Concord, CA
Phase: Engineering Evaluation/Cost Analysis
Base Year: 2004
Date: September 2004

Description: Excavation of soil debris area, stabilization of soil debris, wetlands restoration, land use controls.

DESCRIPTION	Quantity	Unit of Measure	Material Unit Cost	Labor Unit Cost	Equipment Unit Cost	Extended Cost	Notes
CAPITAL COSTS							
Preconstruction Activities							
Fence, 6' High	300.00	LF	11.95	18.71	0.00	$9,198	Mouse-proof fence
Hazardous Waste Signing	2.00	EA	24.78	108.92	0.00	$267	
Mobilize Equipment (Wetlands)	1.00	LS	7,861.32	0.00	0.00	$7,861	
Biological Monitor	20.00	HR	0.00	66.93	0.00	$1,339	Monitor SMHM and pickleweed
Locate Underground Utilities	1.00	LS	0.00	2000.00	0.00	$2,000	
Truck Scale Rental	1.50	MO	4716.79	0.00	0.00	$7,075	
Portable Ambient Air Analyzer	1.50	MO	2158.20	0.00	0.00	$3,237	
Health and Safety Program	1.00	LS	0.00	50000.00	0.00	$50,000	
Well Abandonment, 2" Well	20.00	LF	1.02	15.07	18.40	$690	Existing wells removed from
SUBTOTAL ($2004)						**$81,668**	excavation area
Haul Road Construction							
Medium Brush, Medium Trees, Clear, Grub, Haul	0.83	ACRE	0.00	11063.33	3622.84	$12,190	
Rough Grading, 14G, 1 Pass	11333.33	SY	0.00	1.14	1.09	$25,273	
Compact Subgrade, 2 Lifts	2833.33	CY	0.00	0.52	0.38	$2,550	
Build Temporary Railroad Crossing[a]	1.00	LS	0.00		0.00	$5,000	cost supplied by railroad
Flagman[a]	80.00	HR	0.00	75.00	0.00	$6,000	cost supplied by railroad
SUBTOTAL ($2004)						**$51,013**	
Preliminary Site Construction							
Medium Brush without Grub, Clearing	1.00	ACRE	0.00	251.05	101.42	$352	Clear and grub staging area
Dozer 105 HP D5, Grubbing & Stacking	121.00	CY	0.00	8.60	4.84	$1,626	Clear and grub staging area
Soloco Mat Rental, one Month with Transport, Install and Remove	44.00	EA	416.57	0.00	0.00	$18,329	10% coverage
Biological Monitor	20.00	HR	0.00	66.93	0.00	$1,339	SMHM trap, remove and monitor
Aqua-Barriers, 8 feet tall by 100 feet long, 2-month lease[b]	6.00	UNITS	15508.33	0.00	0.00	$93,050	Dewatering area barrier (quote)
4" Diameter Contractor's Trash Pump,	10.00	DAY	95.86	40.56	0.00	$1,364	For dewatering
4" Polyethylene (SDR 21) Piping	100.00	LF	1.49	21.87	1.40	$2,476	For dewatering
3 CY, Crawler-mounted, Hydraulic Excavator	5,713.33	CY	0.00	2.74	1.83	$26,110	Excavation of disposal area
Disposable Materials per Sample	3.00	EA	12.14	0.00	0.00	$36	Suitablilty for wetlands
Soil Moisture Content ASTM D2216	3.00	EA	35.38	0.00	0.00	$106	Suitablilty for wetlands
TAL Metals (EPA 6010/7000s), Soil Analysis	3.00	EA	200.00	0.00	0.00	$600	Suitablilty for wetlands
Particle Size Analysis	3.00	EA	100.00	0.00	0.00	$300	Suitablilty for wetlands
Total Organic Carbon, TOC (EPA 9060), Soil Analysis	3.00	EA	42.83	0.00	0.00	$128	Suitablilty for wetlands
Semi-Volatile Organics, GC/MS (SW 8270C), with prep, Soil Analysis	3.00	EA	443.05	0.00	0.00	$1,329	Suitablilty for wetlands
Plastic Laminate Waste Pile Cover	60,245.64	SF	0.17	0.06	0.00	$13,856	
Decontaminate Heavy Equipment	1.00	EA	0.00	924.05	0.00	$924	
SUBTOTAL ($2004)						**$161,927**	
Excavation of Debris							Assume 4 ft average depth
3 CY, Crawler-mounted, Hydraulic Excavator	3,555.56	CY	0.00	2.74	1.83	$16,249	
Biological Monitor	40.00	HR	0.00	66.93	0.00	$2,677	SMHM monitor
4" Diameter Contractor's Trash Pump, 300 GPM	25.00	DAY	95.86	40.56	0.00	$3,411	
Disposable Materials per Sample	50.00	EA	12.14	0.00	0.00	$607	confirmation sampling
Soil Moisture Content ASTM D2216	50.00	EA	35.38	0.00	0.00	$1,769	confirmation sampling
TAL Metals (EPA 6010/7000s), Soil Analysis	50.00	EA	200.00	0.00	0.00	$10,000	confirmation sampling
Plastic Laminate Waste Pile Cover	50,004.24	SF	0.17	0.06	0.00	$11,501	
Decontaminate Heavy Equipment	1.00	EA	0.00	924.05	0.00	$924	
SUBTOTAL ($2004)						**$47,138**	

TABLE B-2 ALTERNATIVE 2 (EXCAVATION,CONFIRMATION SAMPLING,ON-SITE DISPOSAL,LUCS, HABITAT RESTORATION), TOTAL REMEDIAL COST SUMMARY

Engineering Evaluation/Cost Analysis, Site 30, Taylor Boulevard Bridge, Naval Weapons Station Seal Beach Detachment Concord, CA

COST ESTIMATE SUMMARY

Site: Site 30, Taylor Boulevard Bridge
Location: Naval Weapons Station Seal Beach Detachment Concord, CA
Phase: Engineering Evaluation/Cost Analysis
Base Year: 2004
Date: September 2004

Description: Excavation of soil debris area, stabilization of soil debris, wetlands restoration, land use controls.

DESCRIPTION	Quantity	Unit of Measure	Material Unit Cost	Labor Unit Cost	Equipment Unit Cost	Extended Cost	Notes
Transportation and Disposal of Debris Onsite							
988, 7.0 CY, Wheel Loader	80.00	HR	0.00	113.75	219.77	$26,682	
50 Ton, 773, Off-highway Truck	80.00	HR	0.00	89.76	279.89	$29,572	
SUBTOTAL ($2004)						**$56,254**	
Stabilization							
Biological Monitor	100.00	HR	0.00	66.93	0.00	$6,693	SMHM monitor
910, 1.25 CY, Wheel Loader	100.00	HR	0.00	107.75	43.47	$15,122	
12 CY, Dump Truck	100.00	HR	0.00	89.76	0.00	$8,976	
550 Gallon, Stainless Steel Aboveground Wastewater Holding Tank, Rental	1.00	MO	448.10	0.00	0.00	$448	
21,000 Gallon Steel, Open Top, Tank Rental	1.00	MO	1,721.63	0.00	0.00	$1,722	
Portland Cement Type I (Bulk)	931.50	TON	122.53	0.00	0.00	$114,137	
Urrichem Proprietary Additive (Bulk)	62.10	TON	1,683.65	0.00	0.00	$104,555	
1 CY Plywood Boxes	18.00	EA	39.42	85.07	0.00	$2,241	
Operational Labor for Process Equipment	100.00	HR	0.00	99.40	0.00	$9,940	
Bulk Chemical Transport (40,000 Lb Truckload)	51.00	EA	3,562.75	0.00	0.00	$181,700	
15 CY Waste Mixer	1.00	MO	8,017.08	0.00	0.00	$8,017	
Solidification/Stabilization Ancillary Equipment	1.00	EA	12,197.90	0.00	0.00	$12,198	
Maintenance of Solidification/Stabilization Unit	0.05	YR	0.00	15,506.92	0.00	$775	
DOT Steel Drum, 55 Gallon	4.00	EA	114.10	0.00	0.00	$456	
Diesel Fuel	409.00	GAL	1.62	0.00	0.00	$663	
Process Water, Supplied by Tanker Truck	90.00	KGAL	14.42	0.00	0.00	$1,298	
Unclassified Fill, 6" Lifts, On-Site, Includes Spreading and Compaction	1,889.45	CY	0.00	3.42	2.65	$11,469	Disposal cell cover from excavation of disposal area
SUBTOTAL ($2004)						**$480,409**	
Wetlands Restoration							
Unclassified Fill, 6" Lifts, On-Site, Includes Spreading and Compaction	5,262.22	CY	0.00	3.42	2.65	$31,942	From excavation of disposal area
General Area Cleanup	1.00	ACRE	0.00	599.66	58.26	$658	
Silt Fences, Vinyl, 3' High with 7.5' Posts	500.00	LF	0.97	4.65	0.00	$2,810	
Growing Plants in Greenhouse, Planting[c]	10000.00	PLANTS	2.00	0.50	0.00	$25,000	plant on 2' centers
SUBTOTAL ($2004)						**$60,410**	
Post Construction Activities							
Removal of Temporary Railroad Crossing[a]	1.00	LS				$5,000	
Cat 215, 1.0 CY, Soil, Shallow, Trenching	8.01	CY	0.00	1.58	0.89	$20	removal of trench crossing
Backfill with Excavated Material	10.80	CY	0.47	8.06	1.12	$104	removal of trench crossing
Delivered & Dumped, Backfill with Stone	2.01	BCY	35.81	1.79	1.24	$78	removal of trench crossing
Demobilize Equipment (Wetlands)	1.00	LS	7,861.32	0.00	0.00	$7,861	
SUBTOTAL ($2004)						**$13,063**	
Land Use Controls							
Land Use Control Implementation Plan						$39,625	
Environmental Restrictions in Deed						$31,470	
Register and File Deed						$133	
Navy Oversight	25%					$17,807	
SUBTOTAL ($2004)						**$89,035**	
SUBTOTAL ($2004)						$1,129,951	
Contingency	25%					$282,488	10% scope + 15% bid
SUBTOTAL ($2004)						**$1,412,439**	
Professional Labor							
Design and Work Plan	3.00%					$42,373	
Project Management Labor Cost	1.00%					$14,124	
Planning Documents Labor Cost	2.00%					$28,249	
Construction Oversight Labor Cost	3.25%					$45,904	
Reporting Labor Cost	0.75%					$10,593	
As-Built Drawings Labor Cost	0.75%					$10,593	
Public Notice Labor Cost	0.25%					$3,531	
Site Closure Activities Labor Cost	0.25%					$3,531	
Permitting Labor Cost	1.00%					$14,124	
SUBTOTAL ($2004)						$173,024	
TOTAL CAPITAL COST IN 2004 DOLLARS						**$1,585,463**	

TABLE B-2 ALTERNATIVE 2 (EXCAVATION,CONFIRMATION SAMPLING,ON-SITE DISPOSAL,LUCS, HABITAT RESTORATION), TOTAL REMEDIAL COST SUMMARY

Engineering Evaluation/Cost Analysis, Site 30, Taylor Boulevard Bridge, Naval Weapons Station Seal Beach Detachment Concord, CA

COST ESTIMATE SUMMARY

Site: Site 30, Taylor Boulevard Bridge
Location: Naval Weapons Station Seal Beach Detachment Concord, CA
Phase: Engineering Evaluation/Cost Analysis
Base Year: 2004
Date: September 2004

Description: Excavation of soil debris area, stabilization of soil debris, wetlands restoration, land use controls.

DESCRIPTION	Quantity	Unit of Measure	Material Unit Cost	Labor Unit Cost	Equipment Unit Cost	Extended Cost	Notes
OPERATIONS AND MAINTENANCE COSTS:							
Land Use Controls							
Annual Inspection						$2,478	
Contingency	25%					$620	
Navy Oversight	25%					$620	
SUBTOTAL ($2004)						**$3,717**	
TOTAL O&M COST IN 2004 DOLLARS						**$3,717**	
PERIODIC COSTS:							
Annual Report	3	1.00	EA	47928.91		$47,929	
SUBTOTAL ($2004)						**$47,929**	

PRESENT VALUE ANALYSES:

Cost Type	Year	Total Cost	Total Cost per Year	Discount Factor[d,e]	Present Value	Notes
Capital Cost	0	$1,585,463	$1,585,463	1.0000	$1,585,463	
Annual O&M	1-3	$11,151	$3,717	2.9065	$10,803	
Periodic Cost	3	$47,929	$47,929	0.9535	$45,700	
		$1,644,543			**$1,641,966**	
TOTAL PRESENT VALUE OF ALTERNATIVE					**$1,641,966**	

Notes:

Labor rates are based on STAECRU contract

[a] Cost supplied by railroad

[b] Vender quote supplied by Kathy Sullivan of Hydro Solutions, Inc. 800/245-0199 on October 14, 2004

[c] Vendor quote supplied by Pacific OpenSpace, Inc. 707/769-1213 on October 14, 2004

[d] Discount factor = $\frac{1}{(1+i)^t}$ where i = 0.016 for a 3 year technology and t = year (i.e., the present value of the dollar paid in year t at 1.6%)

[e] Multi-year discount factor = $\frac{(1+i)^n - 1}{i(1+i)^n}$ where i = 0.016 for a 3 year technology, t = year, and n = total number of years (i.e., the present value of the dollar paid per year from year 1 to year n at 1.6%)

TABLE B-3 ALTERNATIVE 3 (EXCAVATION, CONFIRMATION SAMPLING, OFF-SITE DISPOSAL, HABITAT RESTORATION).
TOTAL REMEDIAL COST SUMMARY
Engineering Evaluation/Cost Analysis, Site 30, Taylor Boulevard Bridge, Naval Weapons Station Seal Beach Detachment Concord, CA

COST ESTIMATE SUMMARY

Site: Site 30, Taylor Boulevard Bridge
Location: Naval Weapons Station Seal Beach Detachment Concord, CA
Phase: Engineering Evaluation/Cost Analysis
Base Year: 2004
Date: September 2004

Description: Excavation of soil debris area, off-site disposal of soil debris, wetlands restoration, land use controls.

DESCRIPTION	Quantity	Unit of Measure	Material Unit Cost	Labor Unit Cost	Equipment Unit Cost	Extended Cost	Notes
OPERATIONS AND MAINTENANCE COSTS:							
Preconstruction Activities							
Fence, 6' High, Wood	300.00	LF	11.95	18.71	0.00	$9,198	Mouse-proof fence
Hazardous Waste Signing	2.00	EA	24.78	108.92	0.00	$267	
Mobilize Equipment (Wetlands)	1.00	LS	7,861.32	0.00	0.00	$7,861	
Biological Monitor	20.00	HR	0.00	66.93	0.00	$1,339	Monitor SMHM and pickleweed
Locate Underground Utilities	1.00	LS	0.00	2000.00	0.00	$2,000	
Truck Scale Rental	1.00	MO	4716.79	0.00	0.00	$4,717	
Portable Ambient Air Analyzer	1.00	MO	2158.20	0.00	0.00	$2,158	
Health and Safety Program	1.00	LS	0.00	50000.00	0.00	$50,000	
Well Abandonment, 2" Well	20.00	LF	1.02	15.07	18.40	$690	Existing wells removed from
SUBTOTAL ($2004)						**$78,230**	excavation area
Haul Road Construction							
Medium Brush, Medium Trees, Clear, Grub, Haul	0.83	ACRE	0.00	11063.33	3622.84	$12,190	
Rough Grading, 14G, 1 Pass	11333.33	SY	0.00	1.14	1.09	$25,273	
Compact Subgrade, 2 Lifts	2833.33	CY	0.00	0.52	0.38	$2,550	
Build Temporary Railroad Crossing[a]	1.00	LS	0.00	0.00	0.00	$5,000	cost supplied by railroad
Flagman[a]	120.00	HR	0.00	75.00	0.00	$9,000	cost supplied by railroad
SUBTOTAL ($2004)						**$54,013**	
Preliminary Site Construction							
Medium Brush without Grub, Clearing	1.00	ACRE	0.00	251.05	101.42	$352	Clear and grub staging area
Dozer 105 HP D5, Grubbing & Stacking	121.00	CY	0.00	8.60	4.84	$1,626	Clear and grub staging area
Soloco Mat Rental, one Month with Transport, Install and Remove	44.00	EA	416.57	0.00	0.00	$18,329	10% coverage
Biological Monitor	20.00	HR	0.00	66.93	0.00	$1,339	SMHM trap, remove and monitor
Aqua-Barriers, 8 feet tall by 100 feet long, 45-day lease[b]	6.00	UNITS	17383.33	0.00	0.00	$104,300	Dewatering area barrier
4" Diameter Contractor's Trash Pump,	20.00	DAY	95.86	40.56	0.00	$2,728	For dewatering
4" Polyethylene (SDR 21) Piping	100.00	LF	1.49	21.87	1.40	$2,476	For dewatering
SUBTOTAL ($2004)						**$131,151**	
Excavation of Debris							Assume 4 ft average depth
3 CY, Crawler-mounted, Hydraulic Excavator	3,555.56	CY	0.00	2.74	1.83	$16,249	
Biological Monitor	40.00	HR	0.00	66.93	0.00	$2,677	SMHM monitor
4" Diameter Contractor's Trash Pump, 300 GPM	15.00	DAY	95.86	40.56	0.00	$2,046	
Disposable Materials per Sample	50.00	EA	12.14	0.00	0.00	$607	
Soil Moisture Content ASTM D2216	50.00	EA	35.38	0.00	0.00	$1,769	
TAL Metals (EPA 6010/7000s), Soil Analysis	50.00	EA	200.00	0.00	0.00	$10,000	
TCLP (RCRA) (EPA 1311), Soil Analysis	1.00	EA	200.00	0.00	0.00	$200	
Plastic Laminate Waste Pile Cover	50,004.24	SF	0.17	0.06	0.00	$11,501	
Decontaminate Heavy Equipment	1.00	EA	0.00	924.05	0.00	$924	
SUBTOTAL ($2004)						**$45,973**	
Transportation and Disposal of Debris Offsite[c]							
T & D of Debris to a Class I Facility, Assuming RCRA Stabilization for Lead	3235.55	TON	0.00	190.00	0.00	$614,755	Assuming TCLP > 5 ppm Pb
T & D of Debris to a Class I Facility, Assuming Cal-Haz Material	0.00	TON	0.00	80.00	0.00	$0	Assuming TCLP < 5 ppm Pb
T & D of Debris to a Class II Facility	1386.67	TON	0.00	55.00	0.00	$76,267	Assuming STLC < 5 ppm Pb
SUBTOTAL ($2004)						**$691,022**	
Wetlands Restoration							
Unclassified Fill, 6" Lifts, Off-Site, Includes Delivery, Spreading, and Compaction	5262.22	CY	7.00	3.42	2.65	$68,777	
General Area Cleanup	1.00	ACRE	0.00	599.66	58.26	$658	
Silt Fences, Vinyl, 3' High with 7.5' Posts	500.00	LF	0.97	4.65		$2,810	
Growing Plants in Greenhouse, Planting[d]	10000.00	PLANTS	2.00	0.50	0.00	$25,000	plant on 2' centers
SUBTOTAL ($2004)						**$97,245**	
Post Construction Activities							
Removal of Temporary Railroad Crossing[a]	1.00	LS				$5,000	
Cat 215, 1.0 CY, Soil, Shallow, Trenching	8.01	CY	0.00	1.58	0.89	$20	removal of trench crossing
Backfill with Excavated Material	10.80	CY	0.47	8.06	1.12	$104	removal of trench crossing
Delivered & Dumped, Backfill with Stone	2.01	BCY	35.81	1.79	1.24	$78	removal of trench crossing
Demobilize Equipment (Wetlands)	1.00	LS	7,861.32	0.00	0.00	$7,861	
SUBTOTAL ($2004)						**$13,063**	

TABLE B-3 ALTERNATIVE 3 (EXCAVATION, CONFIRMATION SAMPLING, OFF-SITE DISPOSAL, HABITAT RESTORATION).
TOTAL REMEDIAL COST SUMMARY
Engineering Evaluation/Cost Analysis, Site 30, Taylor Boulevard Bridge, Naval Weapons Station Seal Beach Detachment Concord, CA

COST ESTIMATE SUMMARY

Site: Site 30, Taylor Boulevard Bridge
Location: Naval Weapons Station Seal Beach Detachment Concord, CA
Phase: Engineering Evaluation/Cost Analysis
Base Year: 2004
Date: September 2004

Description: Excavation of soil debris area, off-site disposal of soil debris, wetlands restoration, land use controls.

DESCRIPTION	Quantity	Unit of Measure	Material Unit Cost	Labor Unit Cost	Equipment Unit Cost	Extended Cost	Notes
SUBTOTAL ($2004)						$1,110,698	
Contingency	25%					$277,674	10% scope + 15% bid
SUBTOTAL ($2004)						**$1,388,372**	
Professional Labor							
Design and Work Plan	3.00%					$41,651	
Project Management Labor Cost	1.00%					$13,884	
Planning Documents Labor Cost	2.00%					$27,767	
Construction Oversight Labor Cost	3.25%					$45,122	
Reporting Labor Cost	0.75%					$10,413	
As-Built Drawings Labor Cost	0.75%					$10,413	
Public Notice Labor Cost	0.25%					$3,471	
Site Closure Activities Labor Cost	0.25%					$3,471	
Permitting Labor Cost	1.00%					$13,884	
SUBTOTAL ($2003)						**$170,076**	
TOTAL CAPITAL COST IN 2004 DOLLARS						**$1,558,447**	
OPERATIONS AND MAINTENANCE COSTS:							
Pickleweed Regrowth Monitoring							
Annual Inspection						$2,478	
TOTAL O&M COST IN 2004 DOLLARS						**$2,478**	
PERIODIC COSTS:							
Remedial Action report	3	1	EA	$47,929		$47,929	
SUBTOTAL ($2004)						**$47,929**	

PRESENT VALUE ANALYSES:

Cost Type	Year	Total Cost	Total Cost per Year	Discount Factor[e,f]	Present Value	Notes
Capital Cost	0	$1,558,447	$1,558,447	1.0000	$1,558,447	
Annual O&M	1-3	$7,434	$2,478	2.9065	$7,202	
Periodic Cost	3	$47,929	$47,929	0.9535	$45,700	
		$1,613,810			**$1,611,350**	
TOTAL PRESENT VALUE OF ALTERNATIVE					**$1,611,350**	

Notes:
Labor rates are based on the STAECRU contract
[a] Cost supplied by railroad
[b] Vender quote supplied by Kathy Sullivan of Hydro Solutions, Inc. 800/245-0199 on October 14, 2004
[c] Quote from Brian Mansfield at Chem Waste Management-Kettleman Hills (916/439-2577). October 2004
[d] Vendor quote supplied by Pacific OpenSpace, Inc. 707/769-1213 on October 14, 2004
[e] Discount factor = $\frac{1}{(1+i)^t}$ where i = 0.016 for a 3 year technology and t = year (i.e., the present value of the dollar paid in year t at 1.6%)
[f] Multi-year discount factor = $\frac{(1+i)^n - 1}{i(1+i)^n}$ where i = 0.016 for a 3 year technology, t = year, and n = total number of years (i.e., the present value of the dollar paid per year from year 1 to year n at 1.6%)

TABLE B-4: SITE 30 COST SUMMARY FOR REMEDIAL ALTERNATIVES

Engineering Evaluation/Cost Analysis, Site 30, Taylor Boulevard Bridge, Naval Weapons Station Seal Beach Detachment Concord, CA

COMPARISON OF TOTAL COST OF REMEDIAL ALTERNATIVES

Site: Site 30, Taylor Boulevard Bridge
Location: Naval Weapons Station Seal Beach Detachment Concord, CA
Phase: Engineering Evaluation/Cost Analysis
Base Year: 2004
Date: September 2004

	Alternative 1	Alternative 2	Alternative 3
Description	**Monitoring**	**Excavation, Stabilization, Site Restoration, LUCs**	**Excavation, Disposal, Site Restoration, LUCs**
Total Project Duration (Years)	30	3	3
Capital Cost	$51,021	$1,585,463	$1,558,447
Annual O & M Cost	$254,926	$10,803	$7,202
Total Periodic Cost	$17,076	$45,700	$45,700
Total Present Value of Alternative	**$323,022**	**$1,641,966**	**$1,611,350**